

6.4 East Section

Chapter 5 provides a discussion of general impacts for each resource, and that discussion provides the general nature of the impacts, such as the duration, extent, whether it is direct or indirect and whether it is adverse or beneficial. It also describes the general nature of the disturbances such as tree clearing, soil disturbance, structure placement, access road construction, and other impacts related to components of the proposed Project. Those general details are not repeated in Chapter 6, which focuses on site specific resources and impacts and refers back to the general details of Chapter 5.

As described in Section 4.5 and identified on Map 4-14, the Central Section is composed of five variation areas: Effie, East Bear Lake, Balsam, Dead Man's Pond, and Blackberry. Section 5.5 previously described, in general, the human settlement, land-based economies, archaeological and historic architectural resources, natural environment, rare and unique natural resources, corridor sharing, and electric system reliability, and costs of constructing, operating, and maintaining the facilities as they relate to the Central Section and the potential impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project. The following sections provide a more detailed description and analysis of the resources present and potential impacts from the proposed Project within the variation areas in the Central Section.

6.4.1 Effie Variation Area

The Effie Variation Area encompasses three route alternatives: the Proposed Blue Route, Proposed Orange Route, and the Effie Variation. This section provides a comparison of the potential impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project within the Effie Variation Area, depending on the route or variation considered.

6.4.1.1 Human Settlement

This section describes the aesthetic resources and zoning and land use compatibility within the Effie Variation Area and the potential impacts from the proposed Project.

Aesthetics

Impacts on aesthetic resources within the Effie Variation Area would be determined based largely on the level of increased contrast in views by sensitive viewers as a result of the proposed Project. These impacts are based on the number of visual

resources, including residences, with high visual sensitivity in close proximity to the transmission line that are likely to have views of and be affected by the proposed Project. Aesthetic impacts are likely to be greatest for views of the proposed Project by sensitive viewers at close distances (e.g., in the foreground distance zone, which can extend out to approximately 0.5 miles), but may also be substantial for views from greater distances. The vegetation surrounding high visual sensitivity areas can also affect the degree of aesthetic impact from the proposed Project. Areas with high visual sensitivity located in a densely forested area may be less likely to see the transmission line, even at a close distance, than a high visual sensitivity area located in an open, agricultural area, located at a much greater distance. Because of the difference in site-specific landscape characteristics among areas deemed as having a high visual sensitivity, the actual impact of the proposed Project could vary widely.

Residences and other aesthetic resources within 1,500 feet from the anticipated alignment of the proposed Project would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI for aesthetic resources. If existing large transmission lines would be followed, a new transmission line would not require clearing of new corridors, but rather an expansion of existing corridors. By paralleling an existing transmission line with structures of similar design and height, a new transmission line would produce less contrast than a transmission line that does not parallel an existing large transmission line.

Data related to aesthetic resources in the Effie Variation Area are summarized in Table 6-160 and shown on Maps 6-51, 6-52, 6-53, and 6-55.

As indicated in Table 6-160 for the Effie Variation Area, the Proposed Blue Route, Proposed Orange Route, and Effie Variation would cross or be located within 1,500 feet of aesthetic resources with high visual sensitivity, including snowmobile trails, a state trail, and state forests. As previously described in Section 5.3.1.1, high viewer sensitivity is typically assigned to viewer groups engaged in recreational or leisure activities; traveling on scenic routes for pleasure or to or from recreational or scenic areas; experiencing or traveling to or from protected, natural, cultural, or historic areas; or experiencing views from resort areas or their residences. Not including residences, the proposed routes and variation would affect similar numbers of aesthetic resources, **with the Proposed Blue Route affecting 10, the Proposed Orange Route affecting 11, and the Effie Variation affecting 10.** The Proposed Blue

Table 6-160 Aesthetic Resources within the ROI in the Effie Variation Area

Resource	Evaluation Parameter ⁽¹⁾	Effie Variation Area		
		Proposed Blue Route	Proposed Orange Route	Effie Variation
Transmission Line	Length (mi)	41.1	44.6	49.8
Existing Transmission Line ⁽²⁾	Percent of Total Length ⁽³⁾	0	0	80
Residences	Count within 0–500 ft	0	1	2
	Count within 0–1,000 ft	1	2	12
	Count within 0–1,500 ft	4	5	16
Historic Architectural Sites	Count within 0–1,500 ft	1	1	0
	Count within 0–5,280 ft	1	1	3
State Trails	Count within 0–1,500 ft	1	1	1
County/Local Parks	Count within 0–1,500 ft	1	1	0
State Forests	Count within 0–1,500 ft	2	2	2
Snowmobile Trails	Count within 0–1,500 ft	5	6	4
Water Access Points	Count within 0–1,500 ft	0	0	1
State Water Trails	Count within 0–1,500 ft	0	0	0

Source: Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Minnesota Power 2014, reference (146); SHPO 2014, reference (147); MnDNR 2003, reference (182); Itasca County, reference (153); MnDNR 2003, reference (148); MnDNR 2010, reference (150); MnDNR 2003, reference (190); MnDNR 2010, reference (183)

Note(s): Totals may not sum due to rounding

- (1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.
- (2) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Route would cross five snowmobile trails, one state trail, and two state forests and would be located within 1,500 feet of a county park (Map 6-53 and Map 6-55). The Proposed Orange Route would cross six snowmobile trails, one state trail, and two state forests and would be located within 1,500 feet of a county park. The Effie Variation would cross four snowmobile trails, one state trail, and two state forests (Map 6-53 and Map 6-55). It would also be located within 1,500 feet of a water access point. **The Proposed Blue Route and the Proposed Orange Route would both be located within 1,500 feet of a historic architectural site and the Effie Variation would be located within one mile of three historic architectural sites.**

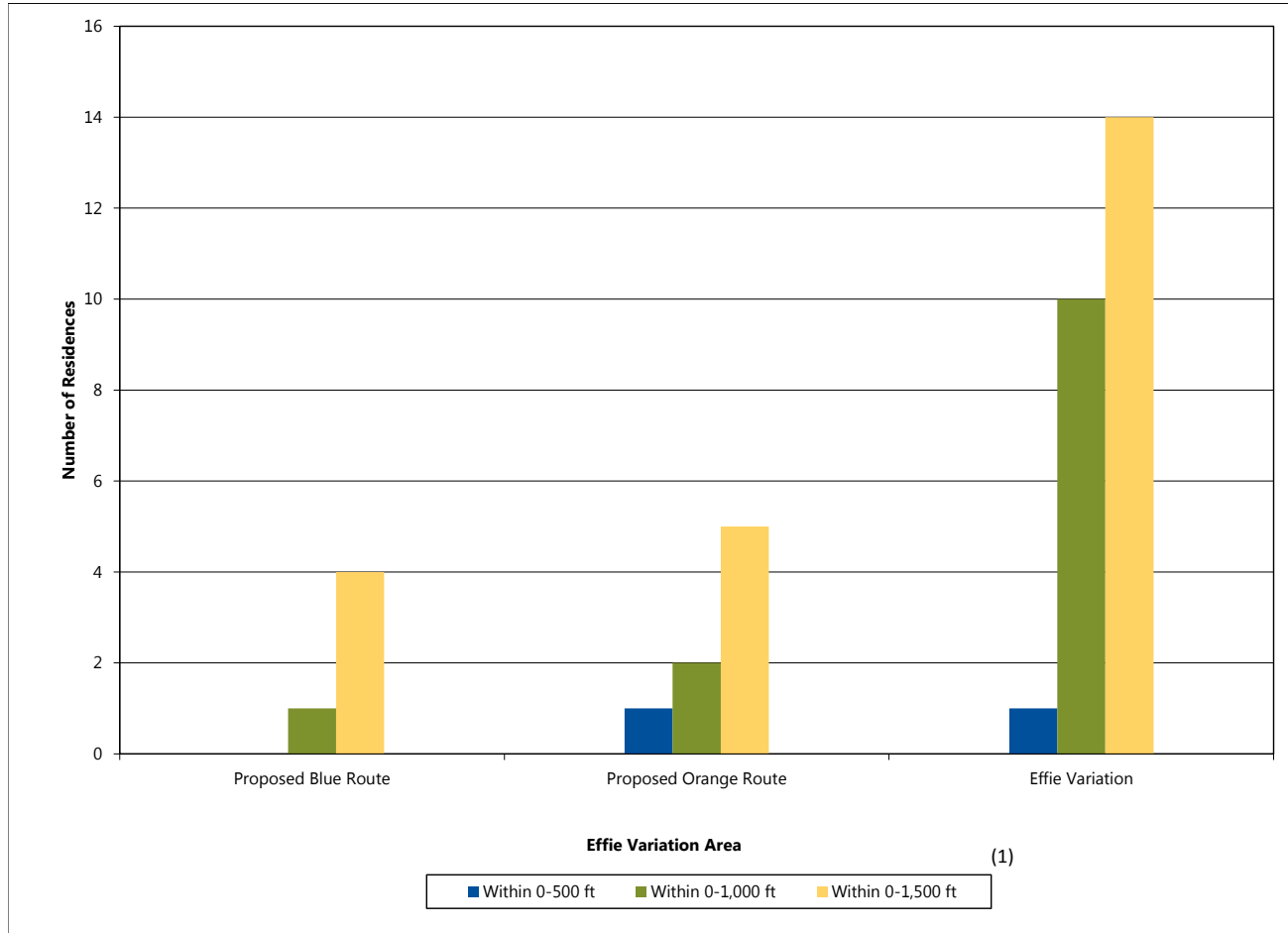
The Effie Variation would be located within 1,500 feet of 16 residences (12 of which are located within 1,000 feet and two of which are within 500 feet), which have potentially high visual sensitivity, whereas the Proposed Blue Route and Proposed Orange Route would be located within 1,500 feet of four (only one residence within 1,000 feet and no residences within 500 feet) and five residences (two within 1,000 feet and one within 500 feet), respectively (Figure 6-99). The Effie Variation has more residences within 1,500 feet of its anticipated alignment that could potentially be impacted

(depending on the surrounding vegetation at each location) and could potentially affect more non-residential aesthetic resources.

The Effie Variation is longer (49.8 miles) than either the Proposed Blue Route (41.1 miles) or the Proposed Orange Route (44.6 miles; Table 6-160). However, the Effie Variation parallels two existing adjacent large transmission lines (both a 500 kV and a 230 kV transmission line) for 80 percent of its length, whereas the other two alternatives do not parallel any existing large transmission lines and would require new corridors to be cleared. By paralleling two existing large transmission lines, the Effie Variation would produce substantially less contrast than either the Proposed Blue Route or the Proposed Orange Route.

Although the Effie Variation would be longer and produce substantially less contrast than the other two routes, **it would affect more residences (16), including 12 within 1,000 feet and two within 500 feet** of the anticipated alignment, and aesthetic resources with high visual sensitivity (three historic architectural sites, one state trail, two state forests, four snowmobile trails, one water access point). However, by paralleling existing multiple large transmission lines already visible from many of the

Figure 6-99 Residences within the ROI in the Effie Variation Area



Source(s): Minnesota Power 2014, reference (146)

Note(s): Totals may not sum due to rounding

(1) Area/Count within a distance includes both sides of the anticipated alignment. For example, count within 0-500 ft includes 500 ft on each side of the anticipated alignment.

residences and other aesthetic resources, it is likely that the addition of a third large transmission line adjacent to the existing transmission lines would result in only an incremental increase in contrast for views of the new transmission line in conjunction with the existing transmission lines. The incremental increase in contrast would be slightly greater where the new transmission line is located between the existing lines and viewers and slightly less where the new transmission line is located on the opposite side of the existing transmission line from viewers. For these reasons, it is likely that despite being longer and affecting more residences and other aesthetic resources with high viewer sensitivity, the Effie Variation would result in less aesthetic impact than either the Proposed Blue Route or Proposed Orange Route in the Effie Variation Area.

Because the Proposed Blue Route and Proposed Orange Route are moderately long at 41.1 and 44.6 miles, respectively, do not parallel existing transmission lines of similar size and design, and

affect several residences (**four to five residences**) and other sensitive visual resources (one historic architectural site each, one state trail, one county/local park, two state forests, and five to six snowmobile trails), potential aesthetic impacts of the Proposed Blue Route and Proposed Orange Route are expected to be significant. Although the Effie Variation parallels an existing large transmission line for much of its length (80 percent), it is moderately long (49.8 miles) and affects **16 residences** and several other sensitive visual resources (three historic architectural sites, one state trail, two state forests, four snowmobile trails, and one water access point). For these reasons, potential aesthetic impacts of the Effie Variation are also expected to be significant.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on aesthetics are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize,

or mitigate impacts on these resources from the proposed Project.

Land Use Compatibility

As explained in Section 5.3.1.1, the ROI for Land Use Compatibility was determined to be 1,500 feet from the anticipated alignments of the proposed Project.

Land Uses

Table 6-161 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignments of the Proposed Blue Route, Proposed Orange Route, and Effie Variation in the Effie Variation Area. Generally, the percentage of each land use is representative of what is present within the ROW. The various land uses present in the variation area are shown in Map 5-19 and residences, churches, cemeteries, and airports near the Proposed Blue Route, Proposed Orange Route, and Effie Variation are shown on Map 6-51.

The Proposed Blue Route, Proposed Orange Route, and Effie Variation ROI are both primarily composed of forested and/or swamp land (Table 6-161). The Effie Variation ROW contains a greater amount of forested/swamp land and developed or disturbed area as compared to the Proposed Blue Route and the Proposed Orange Route.

Land Ownership and Management

Table 6-162 and Figure 6-100 show that the Effie Variation ROW contains a greater amount of state forest land and state fee land than the Proposed Blue Route and Proposed Orange Route; with the Proposed Blue Route ROW containing the least amount of these land ownership categories. No impacts to USFWS Interest Lands would occur for the proposed routes or variation. Both the Proposed

Blue Route and Proposed Orange Route would impact a small amount of county land, while the Effie Variation would not impact this land ownership type. The Proposed Blue Route and Proposed Orange Route would impact a similar amount of state conservation land; however, the Effie Variation would impact a greater amount of this land type.

Neither of the proposed routes would parallel an existing corridor; however a small segment of each would parallel a road or fence line). Approximately 80 percent of the Effie Variation would parallel an existing corridor, and therefore would be expected to have less incompatibility with surrounding land uses compared to the proposed routes (see Section 6.4.1.6).

Impacts to land use from the proposed Project in the Effie Variation Area would be similar to those described in Section 6.2.1.1. The Proposed Blue Route, Proposed Orange Route, and the Effie Variation would all result in a long-term change in land use for areas currently forested and/or swamp land and therefore would all have significant impacts on land use. The level of significance is largely related to the amount of forested and/or swamp land, specifically state forest and state fee land that would be within the ROW of the proposed routes and variation. However, the length of the route that would parallel an existing corridor is also important. The Proposed Blue Route avoids a greater amount of state forest and state fee lands than the Proposed Orange Route and the Effie Variation thereby avoiding long-term changes to land use. However, the Effie Variation would parallel a greater length of existing corridor compared to the Proposed Blue Route and Proposed Orange Route and would minimize indirect impacts to state forests and state fee lands such as forest fragmentation.

Table 6-161 Land Uses within the ROI in the Effie Variation Area

Resource	Type ⁽¹⁾	Evaluation Parameter ⁽²⁾	Effie Variation Area		
			Proposed Blue Route	Proposed Orange Route	Effie Variation
GAP Land Cover Vegetation Class Level - Division 4	Total	Acres within 0–1,500 ft	15,085	16,344	18,273
	Developed or Disturbed	Acres within 0–1,500 ft	239	398	493
	Agricultural	Acres within 0–1,500 ft	0	0	0
	Forested and/or Swamp	Acres within 0–1,500 ft	14,723	15,801	17,696
	Other	Acres within 0–1,500 ft	123	145	84

Source(s): USGS 2001, reference (151)

Note(s): Totals may not sum due to rounding

- (1) Other category includes: Open water, Great Plains Grassland & Shrubland and Introduced & Semi Natural Vegetation. See detailed summary of all types in Appendix E.
- (2) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0-500 ft includes 500 ft on each side of the anticipated alignment.

Table 6-162 Land Ownership/Management within the Anticipated ROW in the Effie Variation Area

Resource	Type	Evaluation Parameter	Effie Variation Area		
			Proposed Blue Route	Proposed Orange Route	Effie Variation
Total Land	--	Acres within ROW	997	1,081	1,209
State Forests	--	Acres within ROW	909	958	1,086
State Fee Lands ⁽¹⁾ Total	--	Acres within ROW	645	694	772
State Fee Lands ⁽¹⁾ by Type	Consolidated Conservation	Acres within ROW	0	0	0
	Other - Acquired, Tax Forfeit, Volstead	Acres within ROW	409	471	507
	Trust Fund	Acres within ROW	235	223	265
	Federal - State Lease	Acres within ROW	0	0	0
County Lands	--	Acres within ROW	10	4	0
State Conservation Easements	--	Acres within ROW	200	196	293
Private Lands⁽²⁾	--	Acres within ROW	342	383	437

Source(s): MnDNR 2003, reference (148); MnDNR 2014, reference (152); Itasca County 2014, reference (153); MnDNR 2010, reference (184)

Note(s): Totals may not sum due to rounding

(1) This dataset represents state land ownership using public land survey quarter-quarter sections as the smallest unit. In some cases, multiple state lands are located within a single quarter-quarter section. Therefore, features may be duplicated and the analysis results may over-represent potential impacts.

(2) Acreage for private lands was calculated as the difference between total lands and public lands.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on land use are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.4.1.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the Effie Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the Effie Variation Area are summarized in Table 6-163.

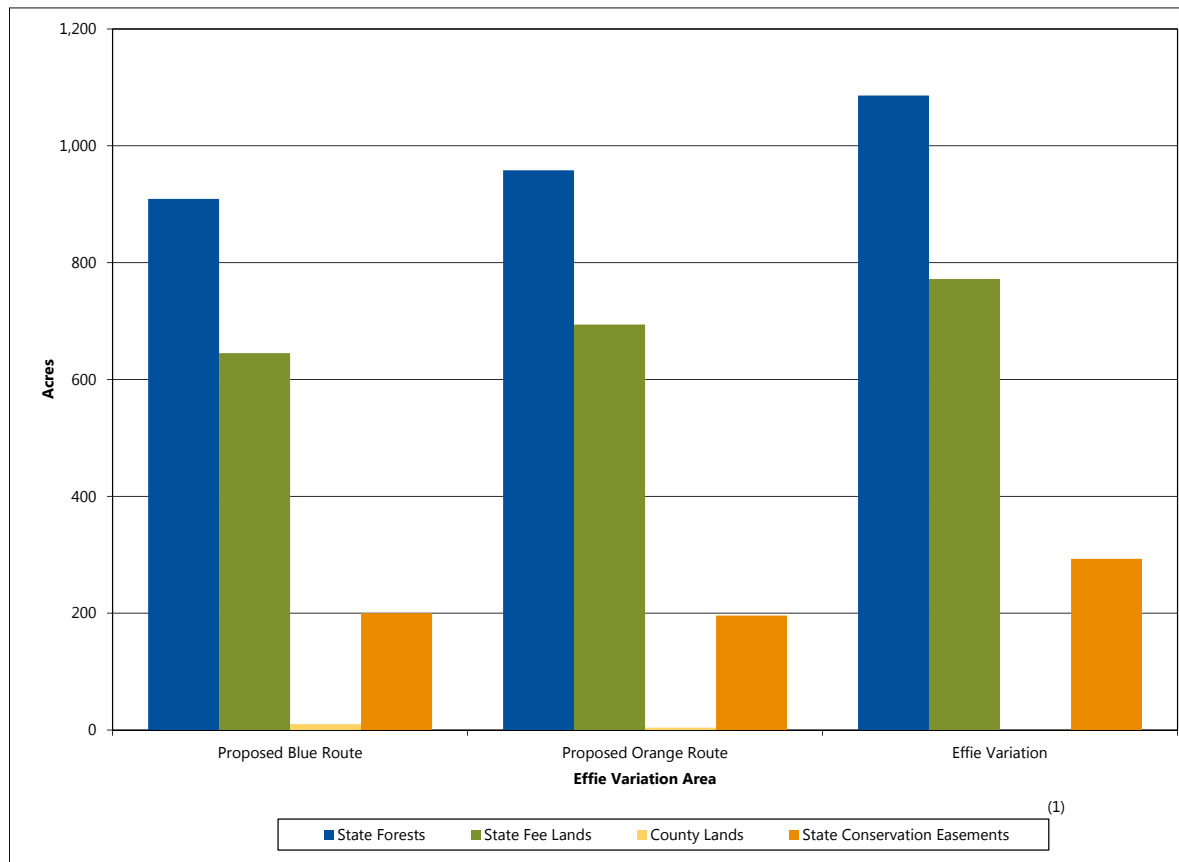
Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-163 and Figure 6-101 show the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the Proposed Blue Route, Proposed Orange Route and Effie Variation in the ROI.

The Effie Variation, which has the longest length, would pass through the most acres of farmland (Figure 6-101). The Proposed Blue Route, which has the shortest length, would be expected to have the fewest impacts on farmland, farmland of statewide importance, and prime farmland.

As discussed in Section 5.3.2.1, construction activities could limit the use of fields or could affect crops and soil by compacting soil, generating dust, damaging crops or drain tile, or causing erosion. Construction activities would also cause long-term adverse impacts to agriculture by the potential loss of income due to the removal of farmland for transmission line structures and associated facilities. Maintenance and emergency repair activities could result in direct adverse impacts on farmlands from the removal of crops, localized physical disturbance, and soil compaction caused by equipment.

Potential construction, operation, maintenance, and emergency-repair short-term and long-term impacts on agricultural resources are summarized in Section 5.3.2.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Figure 6-100 Public Land Ownership/Management within the ROI in the Effie Variation Area


Source(s): MnDNR 2003, reference (148); MnDNR 2014, reference (152); Itasca County 2014, reference (153); MnDNR 2010, reference (184)

Note(s): Totals may not sum due to rounding

- (1) This dataset represents state land ownership using public land survey quarter-quarter sections as the smallest unit. In some cases, multiple state lands are located within a single quarter-quarter section. Therefore, features may be duplicated and the analysis results may over-represent potential impacts.

Table 6-163 Land-Based Economy Resources within the Anticipated ROW in the Effie Variation Area

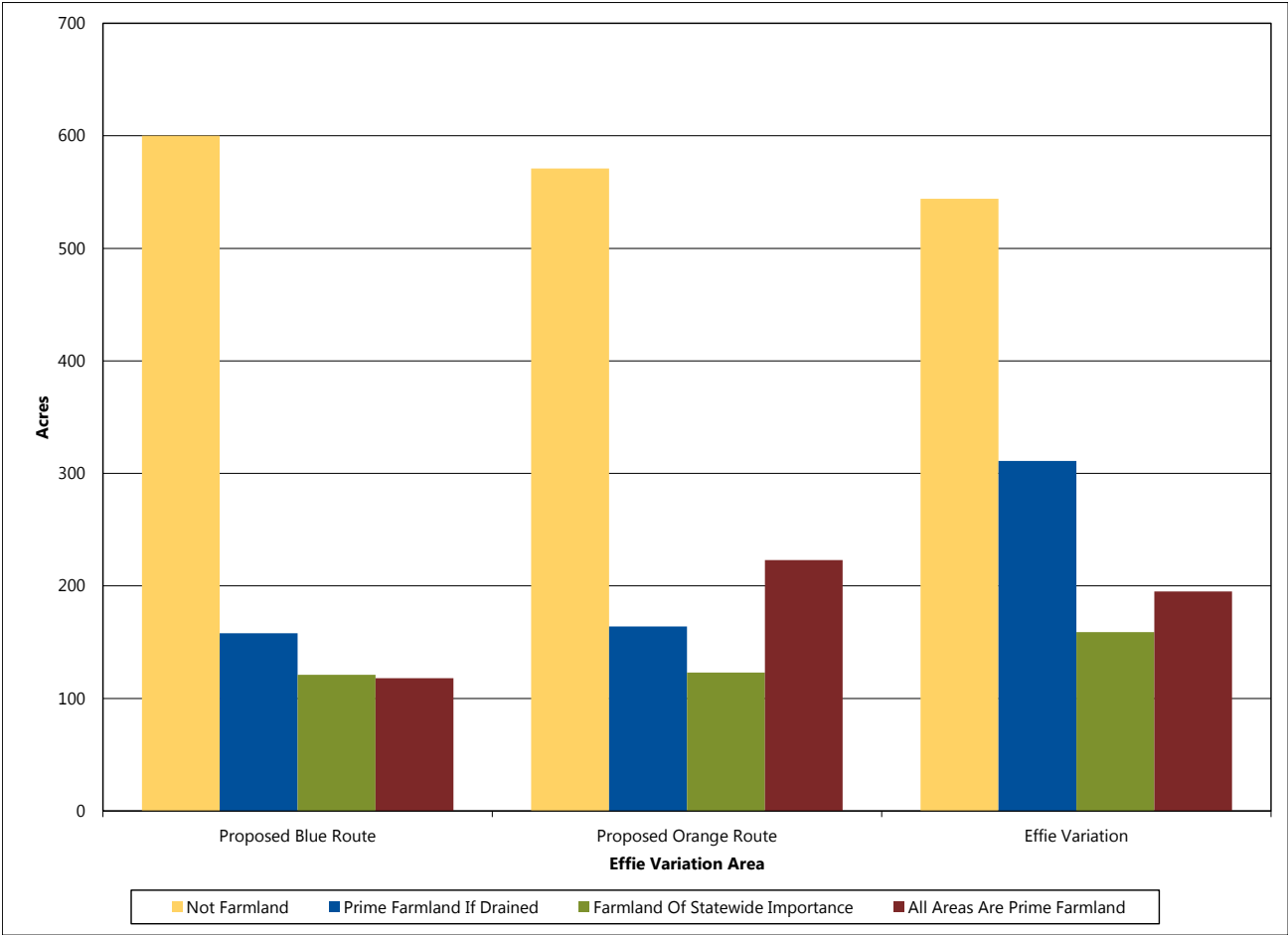
Resource	Type	Evaluation Parameter	Effie Variation Area		
			Proposed Blue Route	Proposed Orange Route	Effie Variation
Transmission Line	--	Length (mi)	41.1	44.6	49.8
Existing Transmission Line ⁽¹⁾	--	Percent of Total Length ⁽²⁾	0	0	80
Farmland	Not Farmland	Acres within ROW	600	571	544
	Prime Farmland if Drained	Acres within ROW	158	164	311
	Farmland of Statewide Importance	Acres within ROW	121	123	159
	All Areas are Prime Farmland	Acres within ROW	118	223	195
State Forest	--	Acres within ROW	909	958	1,086
State Mineral Leases (active and/or expired/terminated)	--	Acres within ROW	647	819	824

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154); MnDNR, reference (148); MnDNR 2014, reference (179)

Note(s): Totals may not sum due to rounding

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-101 Acres of Farmland by Type within the Anticipated ROW in the Effie Variation Area



Source(s): USDA NRCS 2014, reference (154)

Note(s): Totals may not sum due to rounding

Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line. Table 6-163 identifies the acreage of state forest land that would be impacted in the ROI by the Proposed Blue Route, Proposed Orange Route, and the Effie Variation. There are no USDA-USFS national forest lands within the ROI of the Proposed Blue Route, Proposed Orange Route, nor the Effie Variation in the Effie Variation Area.

The Effie Variation, which has the longest length, would pass through the most acres of state forest lands — the Koochiching and George Washington State Forests (Figure 6-102, Map 6-53). The Proposed Blue Route, which has the shortest length, would be expected to have the fewest impacts on timber activities in these state forests.

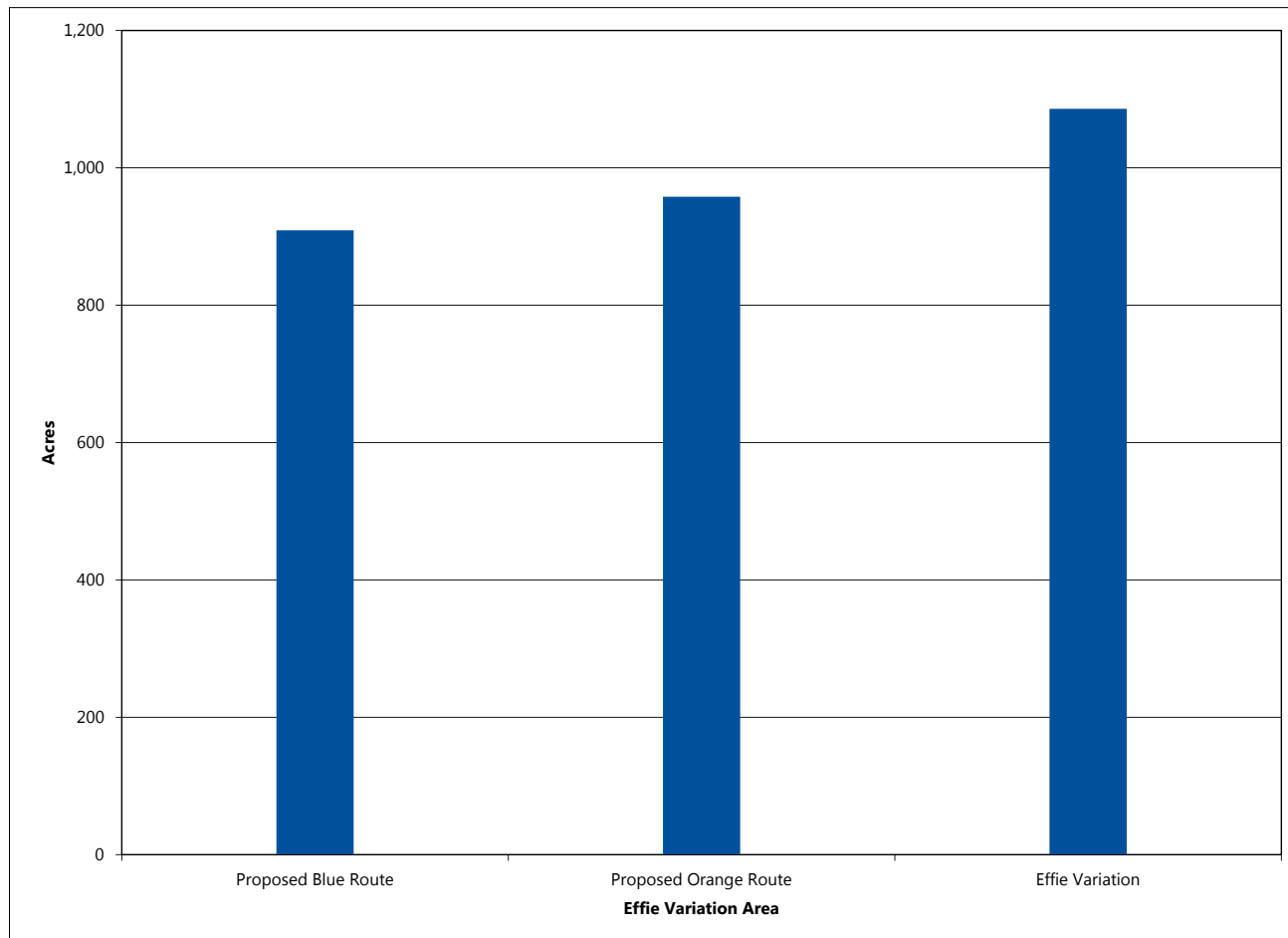
As discussed in Section 5.3.2.2, construction activities could limit timber harvesting efforts, affect timber stands and soil by compaction,

damage trees, or cause erosion. Maintenance and emergency repair activities could also result in direct adverse impacts on forest lands from the removal of vegetation, localized physical disturbance, and compaction caused by equipment. Woody vegetation would routinely need to be cleared from the transmission line ROW in order to maintain low-stature vegetation that would not interfere with the operation of the transmission line.

Potential construction, operation, maintenance, and emergency-repair short-term and long-term impacts on forestry resources are summarized in Section 5.3.2.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Mining and Mineral Resources

As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the transmission line. Table 6-163, Figure 6-103, and Map 6-51 identify the acreage of mining lands with

Figure 6-102 Acres of State Forest Land within the Anticipated ROW in the Effie Variation Area

Source(s): MnDNR 2003, reference (148)

Note(s): Totals may not sum due to rounding

state mineral leases that may be impacted in the Effie Variation Area. There are no known aggregate resources in the ROI of either the proposed routes or Effie Variation.

Both of the proposed routes and the Effie Variation would traverse several acres of mining lands with active and terminated/expired state mineral leases (Table 6-163, Figure 6-103, and Map 6-51). The Effie Variation traverses the most state mineral lease lands; however, it does so adjacent to an existing transmission line corridor, while both of the proposed routes would require the creation of a new corridor through state mineral lease lands (Map 6-51).

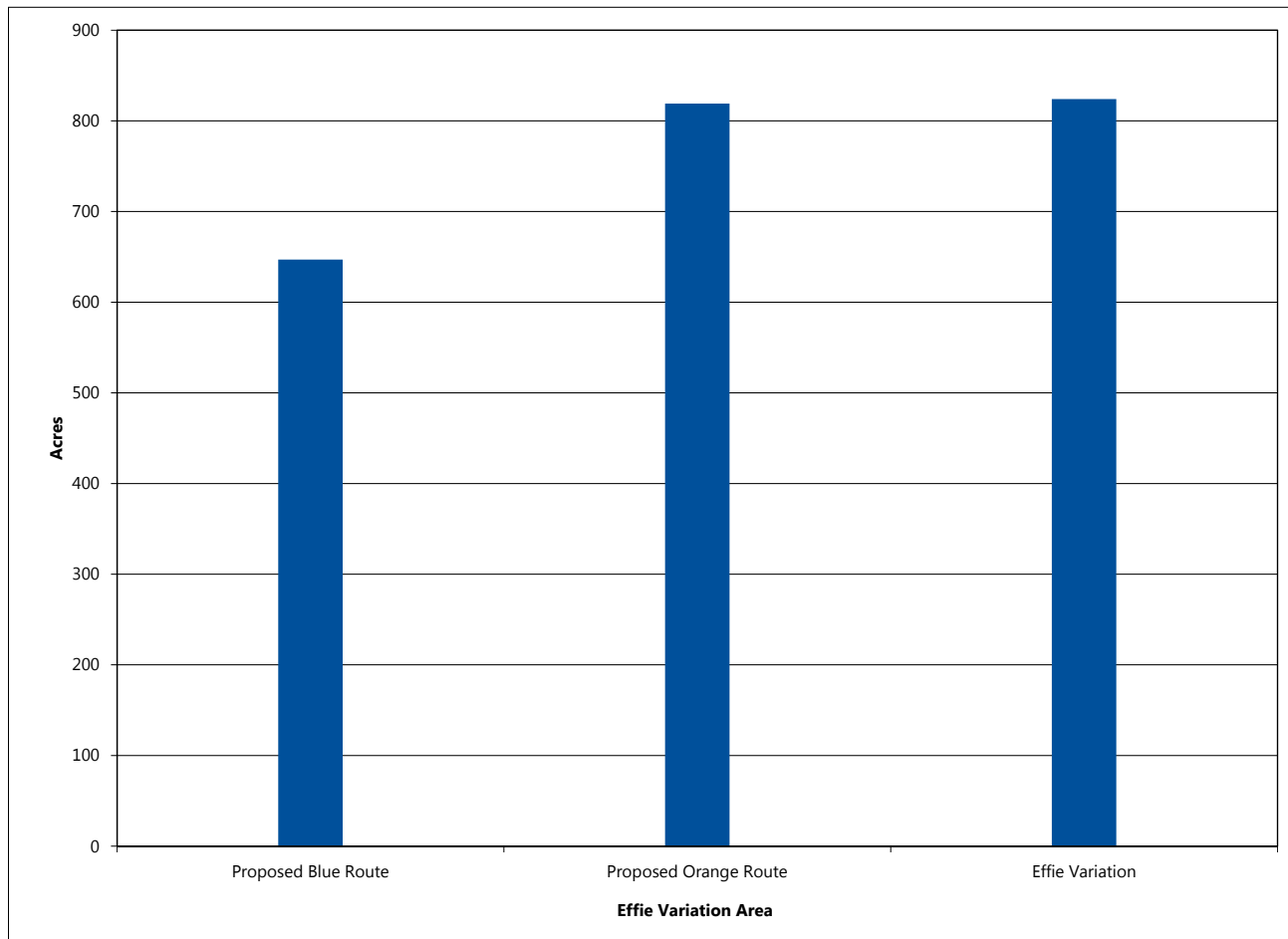
A volcanic belt with known metallic mineral occurrences (gold, copper-zinc-lead, iron) is located in the vicinity of Effie, and approximately 25 miles southeast of Effie. Zones of high mineral potential generally extend southwest to the Chippewa National Forest and northeast into the Lake Vermilion area. The proposed routes and the Effie

Variation would require crossing this volcanic belt. The MnDNR provided comments during the scoping process regarding concerns about the proposed routes and variations crossing these mineral resources. These concerns have been reflected in this EIS, via the consideration of the routing alternatives in this variation area.

As discussed in Section 5.3.2.3, construction of transmission lines could affect future mining operations if the structures interfere with access to mineable resources or the ability to remove these resources.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on mining and mineral resources are summarized in Section 5.3.2.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Figure 6-103 Acres of State Mineral Leases within the Anticipated ROW in the Effie Variation Area



Source(s): MnDNR 2014, reference (179)

6.4.1.3 Archaeology and Historic Architectural Sites

As described in Section 6.2.1.3, the APE for potential direct impacts to archaeological and historic resources includes the ROW of the proposed transmission line; however, potential indirect impacts to historic architectural sites are evaluated within one mile from the anticipated alignment since visual intrusions can change the context and setting of historic architectural sites.

Table 6-164 provides a summary of the previously recorded archaeological **sites** and historic architectural resources within the ROW (direct APE) and within 1,500 feet and one mile of the anticipated alignments (indirect APE) for the Proposed Blue Route, Proposed Orange Route, and the Effie Variation in the Effie Variation Area. A more detailed description of these resources can be found in the Phase IA cultural resources survey report located in Appendix P.

To date, no specific Native American resources have been previously recorded within the ROW (direct APE for cultural resources) or within one mile of the anticipated alignment (indirect APE for historic architectural resources or Native American resources) for the Proposed Blue Route, Proposed Orange Route, and Effie Variation in the Effie Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources within the direct and indirect APEs for the proposed Project.

Within the Effie Variation Area, there no previously recorded archaeological **sites** or historic architectural resources located within the ROW of the Proposed Blue Route and Proposed Orange Route; however an archaeological site is present within the ROW of the Effie Variation (Map 6-52). Site 21KCo is an artifact scatter with an unknown NRHP-**eligibility** status. In addition to the archaeological site within the ROW, the Effie Variation also has a higher number of previously recorded historic architectural sites in the indirect APE when compared to **either of the indirect APEs for the Proposed Blue Route**

Table 6-164 Archaeological and Historic Resources within the Effie Variation Area

Resource	Evaluation Parameter ⁽¹⁾	Effie Variation Area		
		Proposed Blue Route	Proposed Orange Route	Effie Variation
Historic Architectural Sites	Count within ROW	0	0	0
	Count within 0–1,500 ft	1	1	0
	Count within 0–5,280 ft	1	1	3
Archaeological Sites	Count within ROW	0	0	1
	Count within 0–1,500 ft	0	0	2

Source(s): SHPO 2014, reference (147); SHPO 2014, reference (155); SHPO 2014, reference (156)

Note(s): Totals may not sum due to rounding

(1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0-500 ft includes 500 ft on each side of the anticipated alignment.

and Proposed Orange Route (Map 6-52). Two of the three historic architectural sites within the Effie Variation (IC-BEA-009 and IC-BEA-008) have not been evaluated for NRHP eligibility, while the remaining site (IC-CAR-008) has been recommended not NRHP-eligible. For Effie Proposed Blue Route and Orange Route, the one identified historic architectural site in the indirect APE (IC-CAR-009) has not been evaluated for NRHP eligibility.

There is currently potential for direct, long-term, adverse, **impacts** to the one archaeological site (Site 21KCo) identified within the ROW of the Effie Variation from ground disturbance activities associated with construction of the proposed Project. Indirect, long-term, **adverse visual impacts on three previously recorded historic architectural resources** have the potential to occur for the Proposed Blue Route, Orange Route, and Effie Variation. The indirect impacts are likely to occur wherever the proposed Project is visibly prominent in the landscape or a viewshed and appears inconsistent with the existing setting of the architectural resources or within views to and from the architectural resources. Since the archaeological and **historic architectural resources** within the direct and indirect APEs of the routes and variation have not been evaluated for NRHP-eligibility, the proposed Project may result in direct impacts to the archaeological feature for the Effie Variation and indirect impacts resulting from changes to the setting of the historic architectural sites in the indirect APE for the Proposed Blue Route, Orange Route, and Effie Variation that could be considered an adverse impact under Section 106 of the NHPA if these archaeological and historic architectural sites are determined NRHP-eligible and if setting is determined to be a character defining feature that contributes to the significance of the resource.

The Proposed Blue Route, Proposed Orange Route, and Effie Variation have not been surveyed for cultural resources. As such, archaeological surveys, architectural surveys or inventories, and surveys or inventories for Native American resources will be required as part of cultural resources investigations conducted in compliance with federal and/or state regulations for archaeological resources and historic architectural sites. These cultural resources investigations will be implemented as part of the DOE's Draft PA (Appendix V) that will establish a process to identify cultural resources within the direct and indirect APE for the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, and mitigate potential adverse impacts to cultural resources from and operation construction of the proposed Project.

Potential short-term and long-term adverse impacts from construction, operation, maintenance, and emergency repair related to historic and cultural properties are summarized in Section 5.3.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate adverse **impacts** to these resources, including TCPs, from the proposed Project.

6.4.1.4 Natural Environment

This section describes the water, vegetation, and wildlife resources within the Effie Variation Area and the potential impacts from the proposed Project.

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the Effie Variation Area are summarized in Table 6-165 and shown on Map 6-53. Additional,

Table 6-165 Water Resources within the Anticipated ROW in the Effie Variation Area

Resource	Evaluation Parameter	Effie Variation Area		
		Proposed Blue Route	Proposed Orange Route	Effie Variation
Transmission Line	Length (mi)	41.1	44.6	49.8
PWI Waters ⁽¹⁾	Number of Crossings	10	13	13
Non-PWI Waters ⁽²⁾	Number of Crossings	9	11	15
Floodplains ⁽³⁾	Acres within ROW	3	3	0
NWI Wetlands	Acres within ROW	443	391	413

Sources: USFWS 1997, reference (157); USGS 2014, reference (158); USGS 2014, reference (159); Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162); Minnesota Power 2014, reference (163)

Note(s): Totals may not sum due to rounding

- (1) PWI waters include watercourses, waterbodies, and wetlands, as described in Chapter 5. The number of each type of PWI water the Proposed Route and variations would cross are described in the text and figure below.
- (2) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.
- (3) Floodplain acreage includes combined total 100-year and 500-year floodplain acreage. The acreage of floodplain by type that the Proposed Route and variations would cross is described in the text and figure below.

water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

The number of water crossings, the need to place transmissions structures in floodplains and wetlands, and the quantity of wetland type conversion are the primary water resources impacts that would differ across the Proposed Blue Route, the Proposed Orange Route, and the Effie Variation. The Proposed Blue Route, the Proposed Orange Route, and the Effie Variation would not require crossing impaired waters.

The Proposed Blue Route, the Proposed Orange Route, and the Effie Variation would all require one or more crossings of the Bear River, Prairie River, and tributaries to the Bear River, all of which are PWI watercourses. Additional PWI waters that would be crossed by the Proposed Blue Route include the West Fork of the Prairie River, Deer Creek, Deer Lake, a tributary to the Big Fork River, and an unnamed stream. PWI watercourses that would be crossed by the Proposed Orange Route include the East River (3 crossings), Deer Creek, Day Brook (3 crossings), and a tributary to the Big Fork River. PWI watercourses crossed by the Effie Variation include the East River (3 crossings), Valley River, Venning Creek, and Day Brook. The Proposed Blue Route and Proposed Orange Route would both cross PWI Deer Lake, and the Proposed Orange Route would also cross PWI Klingendiel Lake. As shown in Figure 6-104, the Proposed Orange Route and the Variation would require the most PWI water crossings. The proposed routes and Effie Variation would not cross PWI wetlands.

The Proposed Blue Route, the Proposed Orange Route, and the Effie Variation would all cross several non-PWI watercourses and waterbodies. None

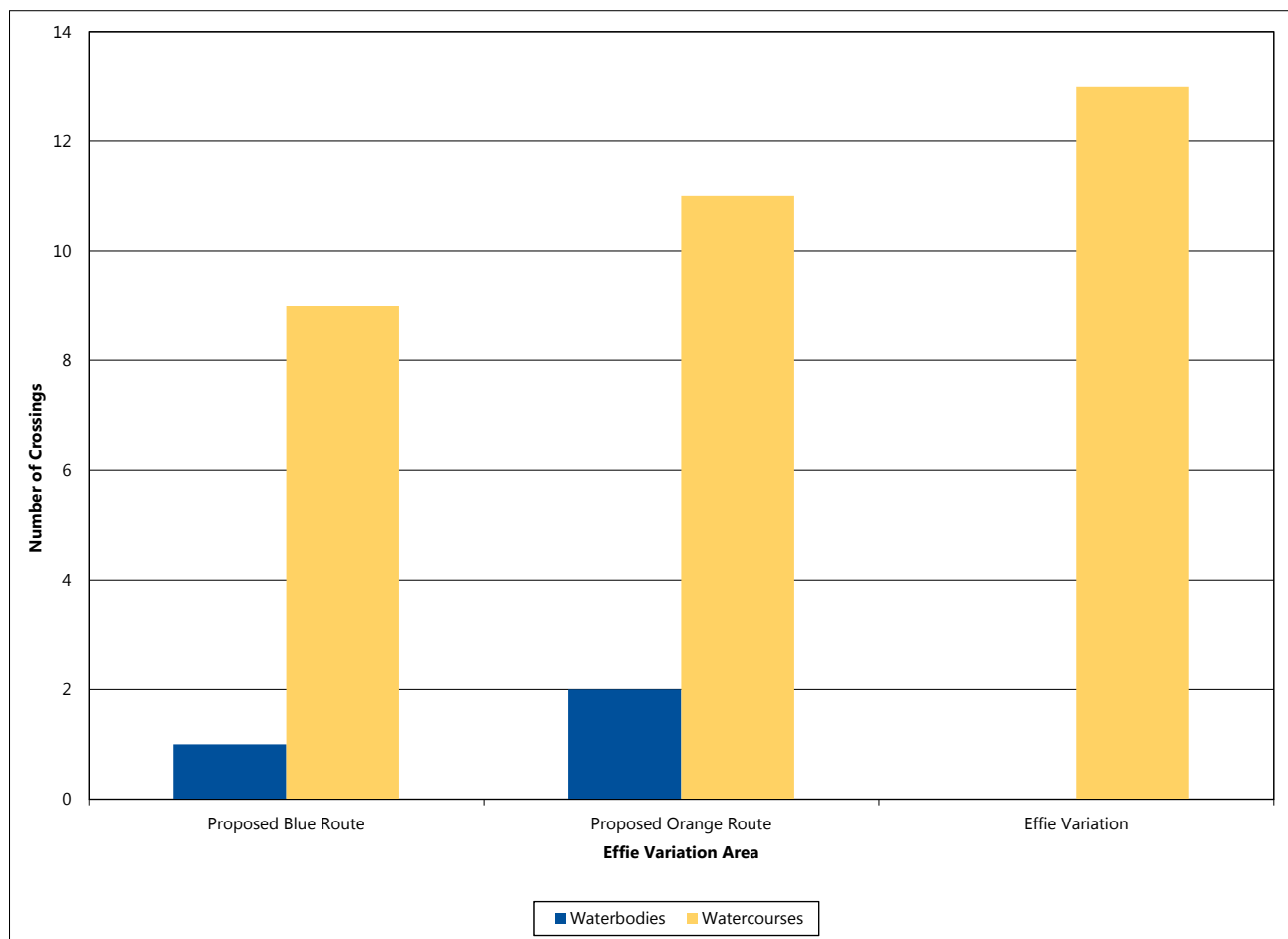
of these routes would cross ditches. As shown in Figure 6-105, the Effie Variation would cross the most non-PWI waters.

The Effie Variation would cross six MnDNR-designated trout streams: Valley River, Venning Creek, and four unnamed tributaries to the Bear River. Neither the Proposed Blue Route nor the Proposed Orange Route would cross any designated trout streams.

It is anticipated that PWI crossings, non-PWI water crossings, and trout streams are spannable (crossings would be less than the average spanning length of 1,250 feet) and transmission structures would not be placed within them.

The Effie Variation would not traverse a floodplain; however, the Proposed Blue Route and the Proposed Orange Route would cross the Zone A floodplain of an unnamed tributary to the Big Fork River. Though the Proposed Blue Route and the Proposed Orange Route would cross floodplains, the crossings would be less than the average spanning length of 1,250 feet. Therefore, it would be expected that the floodplain crossings would be spanned and transmission structures would not be placed within floodplains.

Based on the NWI, the Proposed Blue Route, the Proposed Orange Route, and the Effie Variation would all require conversion of forested and shrub wetland areas to an herbaceous wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-106, the Proposed Blue Route contains the most combined forested and shrub wetland and would result in the greatest amount of wetland type conversion. While these direct, adverse

Figure 6-104 PWI Water Crossings by Type in the Effie Variation Area

Source(s): USGS 2014, reference (158); USGS 2014, reference (159); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162)

Note(s): Totals may not sum due to rounding

impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to be minimal because of the amount of surrounding shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1. The Applicant would need to mitigate for these impacts as summarized in Section 5.3.4.1. The Proposed Blue Route, Proposed Orange Route, and the Effie Variation would all require placement of fill in wetlands for construction of transmission structures, but this impact would be expected to be minimal because of its localized extent (33 square feet per structure). Impacts associated with fill would be minimized by spanning wetlands to the extent practical; however, this impact cannot be completely avoided by spanning due to the high number of wetland crossings that would be needed in the East Section. Due to the number of wetland complexes in the area, it would be expected that the Proposed Blue Route, the Proposed Orange Route, and the Effie Variation would all require temporary construction access through wetlands,

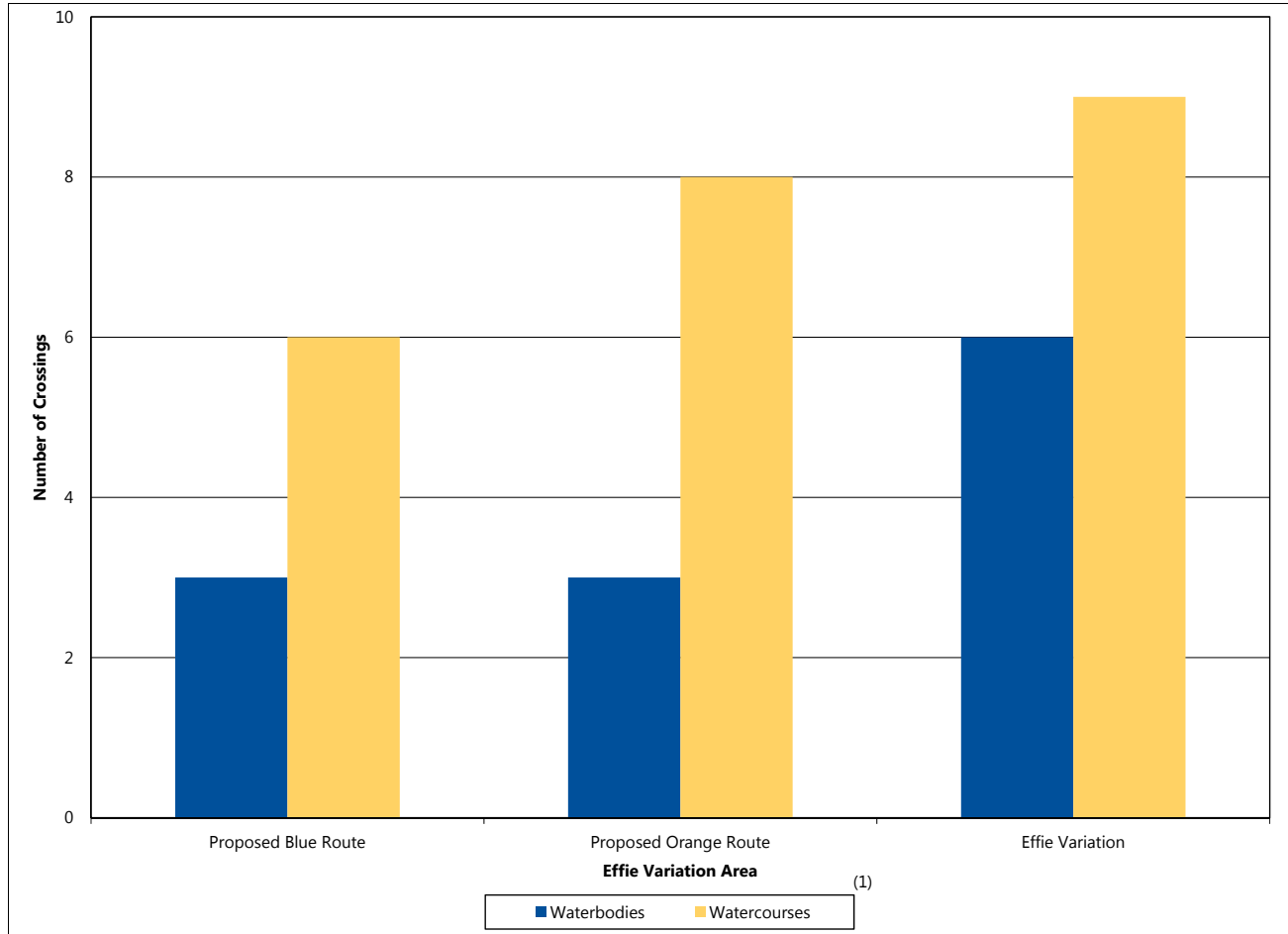
which would be expected to be minimal due to the short-term, localized nature of the impact, and the Applicant's intended use of minimization measures, such as matting.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on water resources are summarized in Section 5.3.4.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Vegetation

In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the Effie Variation Area are summarized in Table 6-166 and shown on Maps 5-19 and 6-53. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

Figure 6-105 Non-PWI Water Crossings by Type in the Effie Variation Area



Source(s): : USGS 2014, reference (158); USGS 2014, reference (159); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162)

Note(s): Totals may not sum due to rounding

(1) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.

The primary impact on vegetation that would differ across the Proposed Blue Route, the Proposed Orange Route, and the Effie Variation is the loss or fragmentation of forest. As discussed in Section 5.3.4.2, the Applicant would permanently clear woody vegetation from the ROW during construction and the ROW would be maintained as low-stature vegetation in order to reduce interference with the maintenance and function of the transmission line.

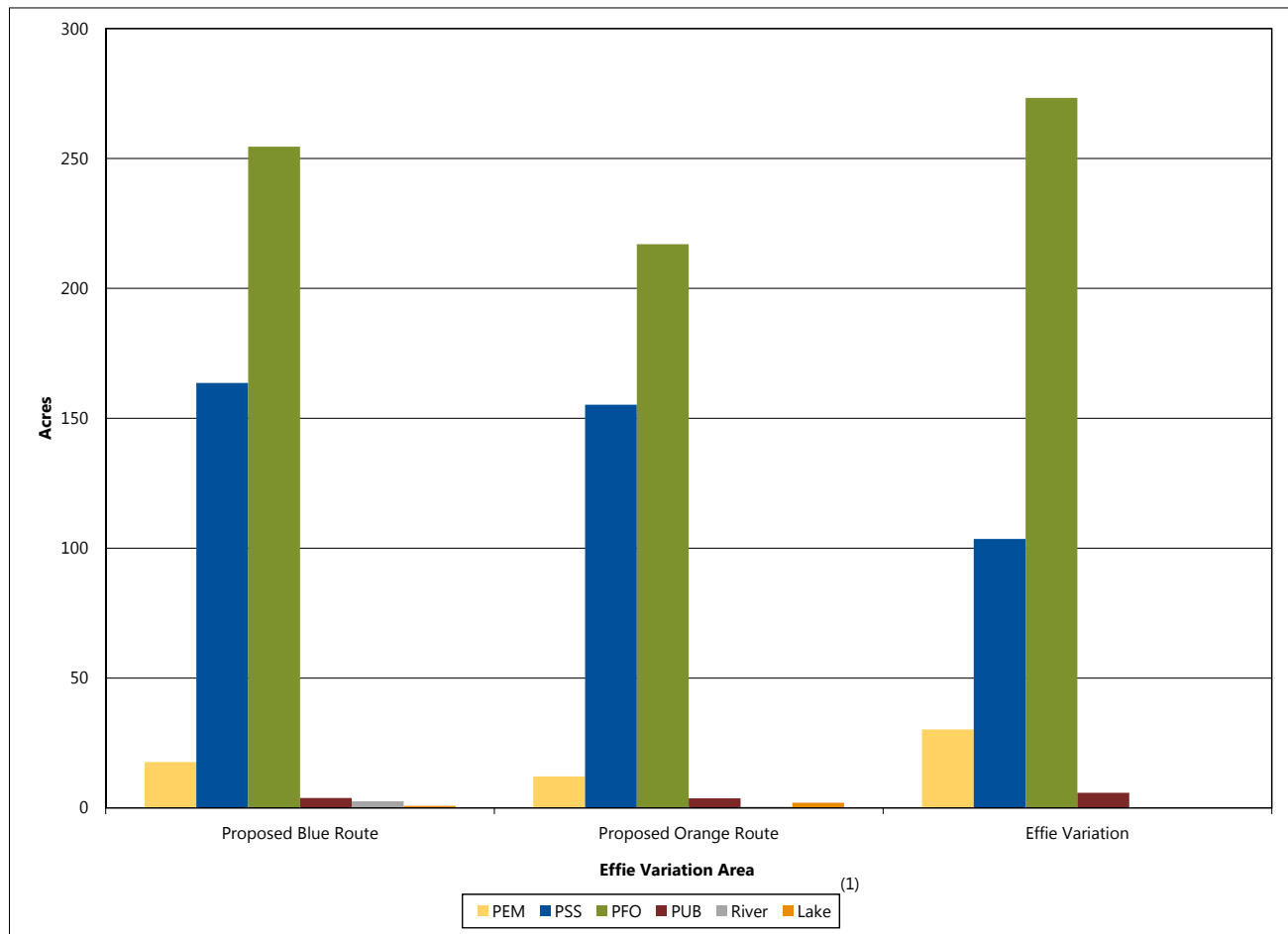
As indicated in Table 6-166 and Figure 6-107, the Effie Variation would pass through more forested land, including state forest land, relative to the Proposed Blue Route and the Proposed Orange Route. Although the Proposed Blue Route and the Proposed Orange Route are shorter in length, they would require creation of new corridor for their entire length, while the Effie Variation would parallel an existing transmission line corridor for the majority of its length (Table 6-166). Because of this, the Effie Variation would likely result in

less impact on intact forested areas. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-19).

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on vegetation resources are summarized in Section 5.3.4.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project. Section 6.2.1.4 (Wildlife) discusses additional suggested measures to avoid, minimize, or mitigate impacts on wildlife are summarized.

Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Data related to wildlife resources in the Effie Variation Area are summarized in Table 6-167 and shown on Map 6-53. Additional,

Figure 6-106 Acres of Wetland by Type within the Anticipated ROW in the Effie Variation Area

Source(s): USFWS 1997, reference (157)

Note(s): Totals may not sum due to rounding

(1) Palustrine emergent wetland (PEM), palustrine shrub wetland (PSS), palustrine forested wetland (PFO), palustrine unconsolidated bottom pond (PUB).

more detailed data related to wildlife resources in this variation area are provided in Appendix E.

The primary impacts on wildlife resources that would differ between the Proposed Blue Route, the Proposed Orange Route, and the Effie Variation include loss and fragmentation of natural and managed wildlife habitat and proximity of the proposed routes and Variation to these areas. A detailed description of fragmentation is found in Section 5.3.4.3, but, in general, an increase in habitat fragmentation would result in the reduction in habitat connectivity. This reduction would have a greater impact on smaller species, such as turtles, and have less of an impact on larger animals, such as deer. While these indirect, long-term adverse impacts would be greater for the Proposed Blue Route and Proposed Orange Route, they are expected to be minimal because of the available contiguous habitat in the region. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor and/or create

new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.4.1.4 (Vegetation) summarizes potential impacts on forested vegetation from the Proposed Blue Route, the Proposed Orange Route, and the Effie Variation.

The Proposed Blue Route and the Proposed Orange Route would pass through the Chippewa Plains Important Bird Area and require creation of new corridor for their entire length, while the Effie Variation avoids the Chippewa Plains Important Bird Area and would parallel an existing transmission line corridor for the majority of its length (Table 6-167; Map 6-53). Because of this, the Effie Variation would result in less fragmentation of forested habitats, and subsequent displacement of wildlife species associated with those forest communities, such as the birds associated with the Chippewa Plains Important Bird Area.

Table 6-166 Vegetation Resources within the Anticipated ROW in the Effie Variation Area

Resource	Evaluation Parameter	Effie Variation Area		
		Proposed Blue Route	Proposed Orange Route	Effie Variation
Transmission Line	Length (mi)	41.1	44.6	49.8
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	0	0	80
State Forest	Acres within ROW	909	958	1086
Total Forested GAP Land Cover	Acres within ROW	978	1047	1164
GAP Land Cover - Dominant Types⁽³⁾				
North American Boreal Forest	Acres within ROW	473	569	556
North American Boreal Flooded and Swamp Forest	Acres within ROW	399	339	364
Eastern North American Cool Temperate Forest	Acres within ROW	25	40	35
Eastern North American Flooded and Swamp Forest	Acres within ROW	81	99	208

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2003, reference (148); USGS 2001, reference (151)

Note(s): Totals may not sum due to rounding

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) Data presented here only includes dominant GAP types; see Appendix E for additional land cover types within the ROW.

Creation of a new corridor in the Chippewa Plains Important Bird Area would likely result in both short-term and long-term direct and indirect adverse impacts on birds and other wildlife associated with the area. The short-term indirect impacts would be associated with construction and alteration of the birds' habitat while the long-term direct impacts would be associated with the operation of the proposed Project, which could result in avian collisions and electrocutions discussed in more detail in Section 5.3.4.3. The short-term indirect impacts are expected to be minimal because of the large amount of similar habitat in the surrounding region, and the long-term direct impacts are expected to be minimized through use of Applicant-proposed minimization measures (Section 2.13).

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on wildlife resources are summarized in Section 5.3.4.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project. Section 6.2.1.4 (Wildlife) discusses additional suggested measures to avoid, minimize, or mitigate impacts on wildlife are summarized.

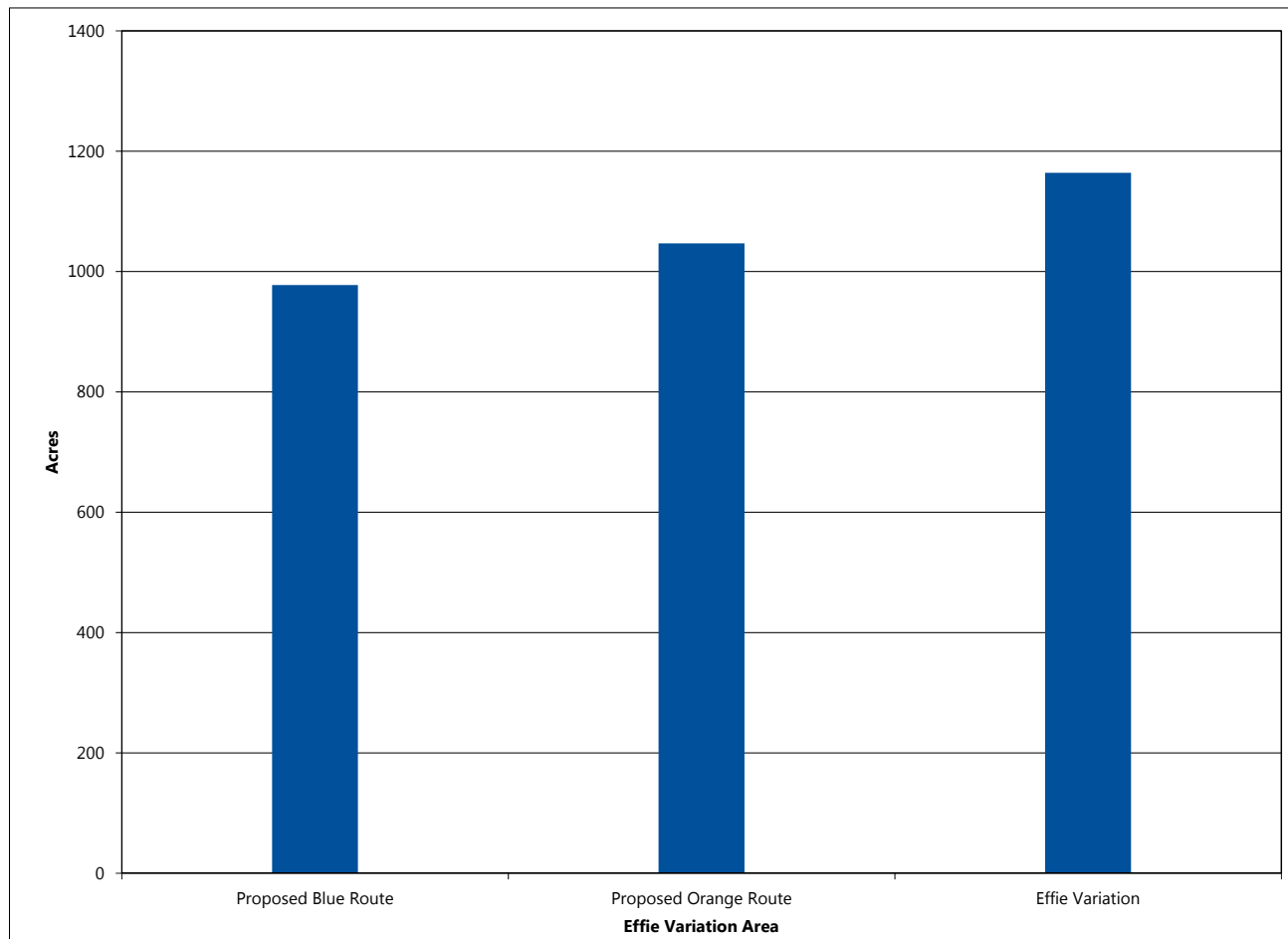
6.4.1.5 Rare and Unique Natural Resources

Rare and unique natural resources are divided into rare species and rare communities. Rare species encompass federally listed or state endangered, threatened, or special concern species while rare communities may include state-designated features, such as SNAs, MBS Sites of Biodiversity Significance, MnDNR High Conservation Value Forest, MnDNR Ecologically Important Lowland Conifer stands, and MBS native plant communities.

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations. Data related to rare species in the Effie Variation Area are summarized in Table 6-168; additional data on rare species, such as the presence of MnDNR tracked species, is provided in Appendix F. As a condition of the license agreement with MnDNR for access to the NHIS database, data pertaining to the documented locations of rare species are not shown on a map.

Proximity of state endangered, threatened, or special concern species differs between the Proposed Blue

Figure 6-107 Acres of all Forested GAP Land Cover Types within the Anticipated ROW in the Effie Variation Area


Source(s): USGS 2001, reference (151)

Note(s): Totals may not sum due to rounding

Table 6-167 Wildlife Resources within the Vicinity of the Effie Variation Area

Resource	Evaluation Parameter	Effie Variation Area		
		Proposed Blue Route	Proposed Orange Route	Effie Variation
Transmission Line	Length (mi)	41.1	44.6	49.8
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	0	0	80
Important Bird Areas	Acres within ROW	69	69	0

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Audubon Society 2014, reference (181)

Note(s): Totals may not sum due to rounding

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Route, the Proposed Orange Route, and the Effie Variation. As discussed in Section 5.3.5, potential long-term impacts on rare species from the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation, including critical habitat designated for gray wolf.

As indicated in Table 6-168, more rare species have been documented within one mile of the Proposed Blue Route and the Proposed Orange Route relative to the Effie Variation. Furthermore, the rare species documented within one mile of the Effie Variation are aquatic species; because it is anticipated that all waterbodies and watercourses would be spanned, impacts to these aquatic species are not expected.

Two colonial waterbird nesting sites have been documented within one mile of the Effie Variation, one of which is located within 1,500 feet of the anticipated alignments. Three colonial waterbird nesting sites have been documented within one mile of the Proposed Blue Route and the Proposed Orange Route, two of which are located within 1,500 feet of the anticipated alignments. As discussed under Wildlife in Section 6.4.1.4 (Wildlife), the Proposed Blue Route and the Proposed Orange Route would also pass through the Chippewa Plains Important Bird Area (Map 6-53).

The Proposed Blue Route and the Proposed Orange Route would require establishment of new corridor for their entire length, while the Effie

Variation would parallel an existing transmission line corridor for the majority of its length. Clearing of forested areas to create new corridor could have impacts on rare species associated with forest or shrub communities. Because the Proposed Blue Route and the Proposed Orange Route would require creation of new corridor for their entire length and a higher concentration of rare species has been documented within one mile of them, the Proposed Blue Route and the Proposed Orange Route would likely result in more impacts on rare species relative to the Effie Variation; however, the full extent of potential impacts from the Proposed Blue Route, the Proposed Orange Route, and the Effie Variation cannot be determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. The MN PUC Route Permit could also require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

The Proposed Blue Route, Proposed Orange Route, and the Effie Variation would cross critical habitat designated for gray wolf. The Proposed Blue Route and Proposed Orange Route would both cross this habitat for approximately 15 miles, along new transmission line corridor, while the Effie Variation would cross this habitat for approximately 25 miles and would parallel an existing transmission line corridor. Although the Effie Variation would cross more critical habitat designated for gray wolf

Table 6-168 Rare Species Documented within One Mile of the Anticipated ROW in the Effie Variation Area

Scientific Name ⁽¹⁾	Common Name	Federal Status	State Status	Type	Effie Variation Area		
					Proposed Blue Route	Proposed Orange Route	Effie Variation
<i>Eleocharis robbinsii</i>	Robbin's Spike-rush	None	Threatened	Vascular Plant	X		
<i>Carex ormostachya</i>	Necklace Spike Sedge	None	Special Concern	Vascular Plant		X	
<i>Lasmigona compressa</i>	Creek Heelsplitter	None	Special Concern	Mussel	X	X	X
<i>Ligumia recta</i>	Black Sandshell	None	Special Concern	Mussel	X	X	
<i>Najas gracillima</i>	Thread-like Naiad	None	Special Concern	Vascular Plant		X	X
<i>Najas guadalupensis</i> ssp. <i>olivacea</i>	Guadalupe waternymph	None	Special Concern	Vascular Plant	X	X	
Colonial Waterbird Nesting Area	Colonial Waterbird Nesting Site	--	--	Animal Assemblage	X	X	X

Source(s): MnDNR **2015**, reference (132)

(1) Canada lynx and gray wolf records are not documented in the NHIS database.

than the proposed routes, it would be expected to have less potential impact on this resource because it would cross in an area where critical habitat designated for gray wolf has already been fragmented.

Any indirect impacts to rare species from the proposed Project are expected to be minimal because of the amount of surrounding habitat. Through use of Applicant proposed avoidance and minimization measures, direct impacts to rare species are not expected. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential impacts on federally listed species (Appendix R).

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on rare species are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Rare Communities

The ROI for the analysis of impacts to rare communities was described within Section 5.3.5 and includes the ROW of the proposed transmission line. Data related to rare communities and resources in the Effie Variation Area are summarized in Table 6-169 and shown on Map 6-54; additional, more detailed data on rare communities and resources is provided in Appendix E.

The primary impact on rare communities and resources that would differ across the Proposed Blue Route, the Proposed Orange Route, and the Effie Variation is the loss or conversion of native vegetation. As discussed in Section 5.3.5, the

Applicant would permanently remove vegetation at each structure footprint and within portions of the ROW that are currently dominated by forest or other woody vegetation.

As indicated on Map 6-54 and in Table 6-169, the Proposed Orange Route would pass through the most MBS Sites of Biodiversity Significance. The Effie Variation would parallel an existing transmission line corridor for much of its length, while the Proposed Blue Route and the Proposed Orange Route would require creation of new corridor for their entire length. Because of this, the Proposed Blue Route and the Proposed Orange Route would result in more fragmentation of intact forest in areas where forest vegetation is present.

The rare communities and resources listed in Table 6-169 and detailed above show that the proposed Project may result in direct, long-term, localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional abundance and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities are expected to be significant if localized adverse impacts would result in a broader regional depletion of certain rare communities. The MN PUC Route Permit could require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on rare communities are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Table 6-169 Rare Communities and Resources within the Vicinity of the Effie Variation Area

Resource	Evaluation Parameter	Effie Variation Area		
		Proposed Blue Route	Proposed Orange Route	Effie Variation
Transmission Line	Length (mi)	41.1	44.6	49.8
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	0	0	80
MBS Sites of Biodiversity Significance ⁽³⁾	Acres within ROW	422	490	427

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MBS 2015, reference (167)

Note(s): Totals may not sum due to rounding

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) MBS Sites of Biodiversity Significance data are preliminary in this portion of the proposed Project. Because of the preliminary status and/or unknown ranks, biodiversity significance ranks are not distinguished from one another here.

6.4.1.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-55 shows areas where the proposed route and variations would parallel corridors with existing transportation, transmission line, or other linear features in the Effie Variation Area.

Table 6-170 identifies the percentage of total transmission line length that the Proposed Blue Route, Proposed Orange Route, and Effie Variation parallel an existing corridor or linear feature in the Effie Variation Area.

The Effie Variation would parallel an existing transmission line corridor for over two thirds of its length (Table 6-170 and Figure 6-108). The Proposed Blue Route parallels existing corridors or linear features for less than one-tenth of its length and the Proposed Orange Route would parallel existing corridors or linear features for just under one-fifth of its length (Table 6-170 and Figure 6-108).

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on corridor sharing are summarized

in Section 5.3.6. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on corridor sharing from the proposed Project.

6.4.1.7 Electrical System Reliability

As explained in Section 5.3.7, the ROI for Electrical System Reliability was determined to be the corridors for the existing transmission lines. Data related to electrical system reliability in the Effie Variation Area are shown on Map 6-55.

The Proposed Blue Route and the Proposed Orange Route would not parallel an existing transmission line in the Effie Variation Area. The Effie Variation, however, would parallel the 500 kV and 230 kV transmission lines for 80 percent of its length. (Table 6-170) Therefore, the Effie Variation would result in three parallel high-voltage transmission lines in adjacent corridors in this area.

The configuration of the Effie Variation may decrease the reliability of the proposed Project. When facilities are located in close proximity, there is a greater risk that a single event can take out multiple lines. Additionally, the close proximity of the lines can make repairing the lines more difficult. These difficulties could increase outage times, should an outage occur. Adverse impacts are possible as a result of the operation of three high-voltage transmission lines under one variation in the East Section.

Table 6-170 Corridor Sharing in the Effie Variation Area

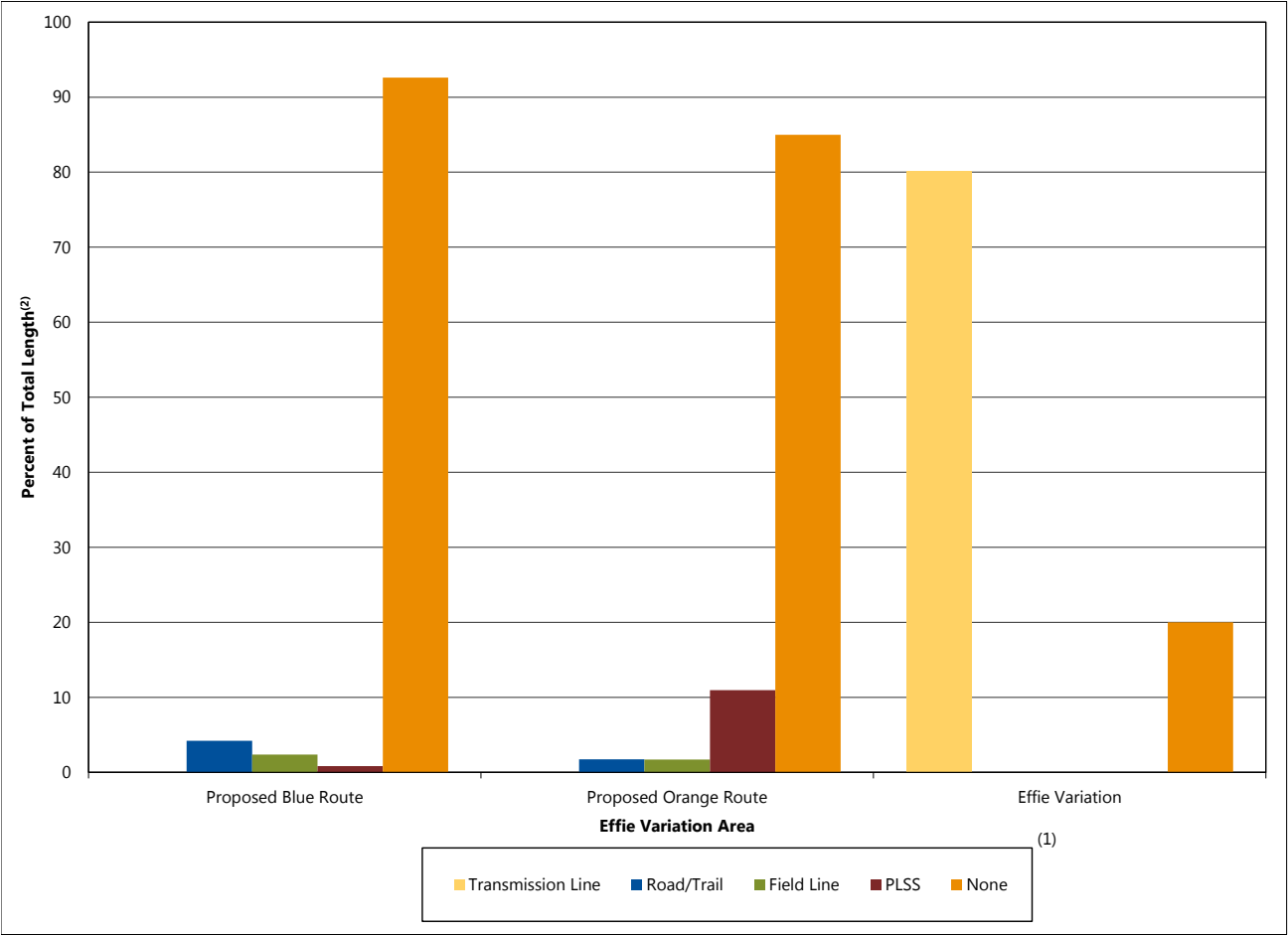
Feature Sharing Corridor ⁽¹⁾	Evaluation Parameter	Effie Variation Area		
		Proposed Blue Route	Proposed Orange Route	Effie Variation
Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field line, PLSS)	Percent of Total Length ⁽²⁾	0	0	80
Road/Trail (other linear features, but not transmission lines, may be present within the road/trail corridor; i.e., PLSS, field line)	Percent of Total Length ⁽²⁾	4	2	0
Field Line (other linear features, but not transmission lines or road/trails, may be present within the field line corridor; i.e., PLSS)	Percent of Total Length ⁽²⁾	2	2	0
PLSS Only	Percent of Total Length ⁽²⁾	1	11	0
None	Percent of Total Length ⁽²⁾	93	85	20

Source(s): : USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

Note(s): Totals may not sum due to rounding

- (1) More than one feature may share the corridor; the primary feature within the corridor is identified, other features that may share the corridor are listed in parenthesis. Appendix E provides a detailed summary of all shared features.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-108 Corridor Sharing in the Effie Variation Area



Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

Note(s): Totals may not sum due to rounding

- (1) Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field line, PLSS); Road Trail (other linear features, but not transmission lines, may be present within the road/trail corridor; i.e., PLSS, field line); Field Line (other linear features, but not transmission lines or roads/trails, may be present within the field line corridor; i.e., PLSS).
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on electrical system reliability are summarized in Section 5.3.7. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on electrical system reliability.

6.4.1.8 Costs of Constructing, Operating, and Maintaining the Facility which are Dependent on Design and Route

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-171 summarizes the costs associated with constructing the Proposed Blue Route, Proposed Orange Route, and Effie Variation in the Effie Variation Area. As

indicated in Table 6-171, the Effie Variation would cost the most to construct, while the Proposed Blue Route would cost the least to construct.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$65,000 to \$80,000 annually for these alternatives in the Effie Variation Area.

6.4.2 East Bear Lake Variation Area

The East Bear Lake Variation Area encompasses two route alternatives: the Proposed Orange Route and the East Bear Lake Variation. This section provides a comparison of the potential impacts resulting

from construction, operation, maintenance, and emergency repair of the proposed Project within the East Bear Lake Variation Area, depending on the route or variation considered.

6.4.2.1 Human Settlement

This section describes the aesthetic resources and zoning and land use compatibility within the East Bear Lake Variation Area and the potential impacts from the proposed Project.

Aesthetics

As described in the Aesthetics discussion for the Effie Variation Area (see Section 6.4.1.1), impacts on aesthetic resources would be determined based largely on the level of increased contrast produced by the proposed Project in views by sensitive viewers. Residences and other aesthetic resources within 1,500 feet of the anticipated alignment would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI. Data related to aesthetic resources in the East Bear Lake Variation Area are summarized in Table 6-172 and shown on Maps 6-56, 6-57, 6-58, and 6-60.

As indicated in Table 6-172 for the East Bear Lake Variation Area, the Proposed Orange Route and East Bear Lake Variation would cross or be located within 1,500 feet of aesthetic resources with high visual sensitivity, including snowmobile trails, a state trail, water access point, and a state forest. Both the Proposed Orange Route and East Bear Lake Variation would cross three snowmobile trails, one state trail, and one state forest (Maps 6-58 and 6-60). In addition, the East Bear Lake Variation would cross within 1,500 feet of a water access point for Little Moose Lake (Map 6-58). The Proposed Orange Route and East Bear Lake Variation would affect similar numbers of aesthetic resources. Neither the Proposed Orange Route nor East Bear Lake Variation would be located within 1,500 feet of any residences, which also have high visual sensitivity.

The East Bear Lake Variation is slightly longer (10.5 miles) than the Proposed Orange Route (8.9 miles; Table 6-172). However, the East Bear Lake Variation parallels two existing adjacent large transmission lines (a 500 kV and a 230 kV transmission line) for 42 percent of its length, whereas the Proposed Orange Route does not parallel any existing large transmission lines and would require a new corridor to be cleared. By paralleling two existing large

Table 6-171 Construction Costs in the Effie Variation Area

Variation Area	Name in the EIS	Cost (Total)	Average Cost (per mile)	Length (mi)
Effie	Proposed Blue Route	\$46,649,600	\$1,135,027	41.1
	Proposed Orange Route	\$49,488,323	\$1,109,604	44.6
	Effie Variation	\$57,353,305	\$1,149,365	49.8

Source(s): Minnesota Power 2015, reference (9); Minnesota Power 2015, reference (186)

Table 6-172 Aesthetic Resources within the ROI in the East Bear Lake Variation Area

Resource	Evaluation Parameter ⁽¹⁾	East Bear Lake Variation Area	
		Proposed Orange Route	East Bear Lake Variation
Transmission Line	Length (mi)	8.9	10.5
Existing Transmission Line ⁽²⁾	Percent of Total Length ⁽³⁾	0	42
State Trails	Count within 0–1,500 ft	1	1
State Forests	Count within 0–1,500 ft	1	1
Snowmobile Trails	Count within 0–1,500 ft	3	3
Water Access Points	Count within 0–1,500 ft	0	1

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2003, reference (182); MnDNR 2003, reference (148); MnDNR 2010, reference (150); MnDNR 2003, reference (190)

Note(s): Totals may not sum due to rounding

- (1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.
- (2) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

transmission lines, the East Bear Lake Variation would produce substantially less contrast than the Proposed Orange Route.

Although the East Bear Lake Variation would be slightly longer (10.5 miles) and affects one additional aesthetic resource (water access point), it would produce substantially less contrast than the Proposed Orange Route because of the existing transmission lines. By paralleling multiple existing large transmission lines for a large portion of its length that are already visible from many of the aesthetic resources, it is likely that the addition of a third large transmission line adjacent to the existing transmission lines would result in only an incremental increase in contrast for views of the new transmission line. The incremental increase in contrast would be slightly greater where the new transmission line is located between the existing transmission lines and viewers and slightly less where the new transmission line is located on the opposite side of the existing transmission line from viewers. For these reasons, the East Bear Lake Variation would result in less aesthetic impact than the Proposed Orange Route in the East Bear Lake Variation Area.

The Proposed Orange Route does not parallel an existing large transmission line of similar size and design, it is short in length (8.9 miles) and affects no residences and only a few other sensitive visual resources (one state trail, one state forest, and three snowmobile trails). Although the East Bear Lake Variation is longer in length, it parallels an existing large transmission line for 42 percent of its length, and affects no residences, and affects only a few other sensitive visual resources (one state trail, one state forest, three snowmobile trails, and one water access point), potential aesthetic impacts of the East Bear Lake Variation are expected to be minimal.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on aesthetics are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Land Use Compatibility

As explained in Section 5.3.1.1, the ROI for Land Use Compatibility was determined to be 1,500 feet from the anticipated alignments of the proposed Project.

Land Uses

Table 6-173 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignments of the Proposed Orange Route and East Bear Lake Variation in the East Bear Lake Variation Area. Generally, the percentage of each land use is representative of what is present within the ROW. The various land uses present in the East Bear Lake Variation Area are shown in Map 5-19 and residences, churches, cemeteries, and airports near the Proposed Orange Route and East Bear Lake Variation are shown on Map 6-56.

The Proposed Orange Route and East Bear Lake Variation ROI are both primarily composed of forested and/or swamp land (Table 6-173). The East Bear Lake Variation ROW contains a greater amount of forested/swamp and developed or disturbed land than the Proposed Orange Route.

Land Ownership and Management

Table 6-174 and Figure 6-109 show that the East Bear Lake Variation ROW contains more state forest land and state fee land than the Proposed Orange Route. No impacts to county lands, state conservation easements, or USFWS Interest Lands

Table 6-173 Land Uses within the ROI in the East Bear Lake Variation Area

Resource	Type ⁽¹⁾	Evaluation Parameter ⁽²⁾	East Bear Lake Variation Area	
			Proposed Orange Route	East Bear Lake Variation
GAP Land Cover Vegetation Class Level - Division 4	Total	Acres within 0–1,500 ft	3,407	3,981
	Developed or Disturbed	Acres within 0–1,500 ft	19	58
	Agricultural	Acres within 0–1,500 ft	0	0
	Forested and/or Swamp	Acres within 0–1,500 ft	3,381	3,910
	Other	Acres within 0–1,500 ft	7	13

Source(s): USGS 2001, reference (151)

Note(s): Totals may not sum due to rounding

- (1) Other category includes: Open water, Great Plains Grassland and Shrubland and Introduced and Semi Natural Vegetation. See detailed summary of all types in Appendix E.
- (2) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0-500 ft includes 500 ft on each side of the anticipated alignment.

Table 6-174 Land Ownership/Management within the Anticipated ROW in the East Bear Lake Variation Area

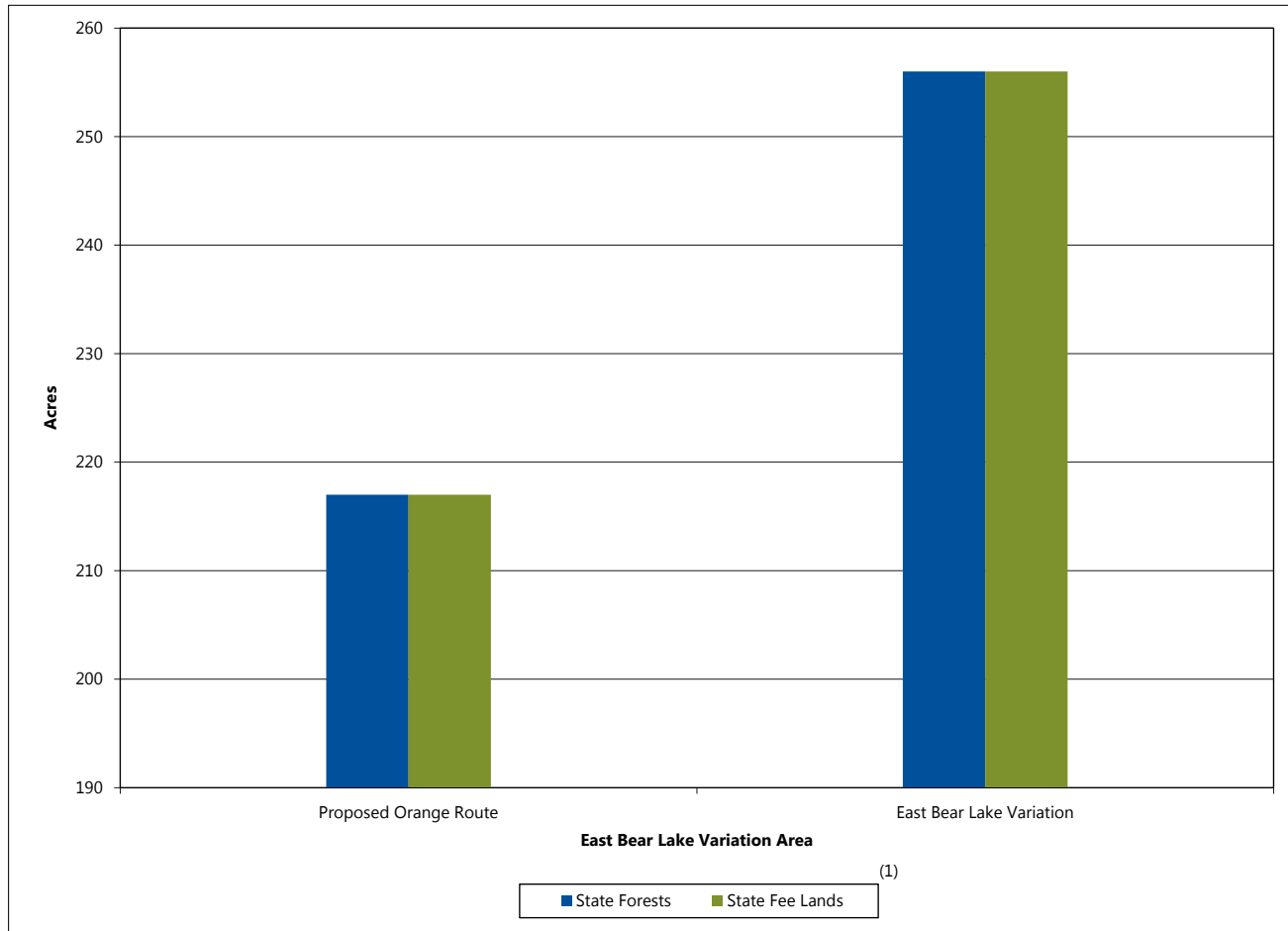
Resource	Type	Evaluation Parameter	East Bear Lake Variation Area	
			Proposed Orange Route	East Bear Lake Variation
Total Lands	--	Acres within ROW	217	256
State Forests	--	Acres within ROW	217	256
State Fee Lands ⁽¹⁾ Total	--	Acres within ROW	217	256
State Fee Lands ⁽¹⁾ by Type	Consolidated Conservation	Acres within ROW	0	0
	Other - Acquired, Tax Forfeit, Volstead	Acres within ROW	164	180
	Trust Fund	Acres within ROW	52	76
	Federal - State Lease	Acres within ROW	0	0
Private Lands	--	Acres within ROW	0	0

Source(s): MnDNR 2003, reference (148); MnDNR 2014, reference (152)

Note(s): Totals may not sum due to rounding

- (1) This dataset represents state land ownership using public land survey quarter-quarter sections as the smallest unit. In some cases, multiple state lands are located within a single quarter-quarter section. Therefore, features may be duplicated and the analysis results may over-represent potential impacts.
- (2) Acreage for private lands was calculated as the difference between total lands and public lands.

Figure 6-109 Public Land Ownership/Management within the ROI in the East Bear Lake Variation Area



Source(s): MnDNR 2003, reference (148); MnDNR 2014, reference (152)

Note(s): Totals may not sum due to rounding

- (1) This dataset represents state land ownership using public land survey quarter-quarter sections as the smallest unit. In some cases, multiple state lands are located within a single quarter-quarter section. Therefore, features may be duplicated and the analysis results may over-represent potential impacts.

would occur under the Proposed Orange Route or the East Bear Lake Variation Area.

The Proposed Orange Route would not parallel an existing corridor, however, approximately 42 percent of the East Bear Lake Variation would parallel an existing corridor (see Section 6.4.2.6); and therefore would be expected to have less incompatibility with surrounding land uses compared to the Proposed Orange Route.

Impacts to land use from the proposed Project in the East Bear Lake Variation Area would be similar to those described in Section 6.2.1.1. The Proposed Orange Route and East Bear Lake Variation would both result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use. The length of the route that would parallel an existing corridor is also important. The Proposed Orange Route avoids a greater amount of state forest and state fee lands than the East Bear Lake Variation thereby avoiding long-term changes to land use. However, the Proposed Orange Route does not parallel an existing corridor, while the East Bear Lake Variation does for approximately 42 percent of its length.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on land use are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.4.2.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the East Bear Lake Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the East Bear Lake Variation Area are summarized in Table 6-175.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-175 and Figure 6-110 show the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the Proposed Orange Route and East Bear Lake Variation in the ROI.

The East Bear Lake Variation would pass through more acres of farmland, including prime farmland (Figure 6-110). The Proposed Orange Route and East Bear Lake Variation would not impact any acres of statewide importance. The East Bear Lake Variation, because it parallels existing corridors for close to half of its length, may have fewer impacts on farmland.

As discussed in Section 5.3.2.1, construction activities could limit the use of fields or could affect crops and soil by compacting soil, generating dust, damaging crops or drain tile, or causing erosion. Construction activities would also cause long-term adverse impacts to agriculture by the potential loss of income due to the removal of farmland for transmission line structures and associated facilities. Maintenance and emergency repair activities could result in direct adverse impacts on farmlands from the removal of crops, localized physical disturbance, and soil compaction caused by equipment.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on agricultural resources are summarized in Section 5.3.2.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line. Table 6-175 identifies the acreage of state forest land that would be impacted in the ROI by the Proposed Orange Route and the East Bear Lake Variation. There are no USDA-USFS national forest lands within the ROI of the Proposed Orange Route or the East Bear Lake Variation in the East Bear Lake Variation Area.

The East Bear Lake Variation would pass through more acres of state forest lands – the George Washington State Forest (Figure 6-111, Map 6-58). The East Bear Lake Variation, because it parallels existing corridors for close to one-half of its length, would be expected to have the fewest impacts on timber activities in the George Washington State Forest.

As discussed in Section 5.3.2.2, construction activities could limit timber harvesting efforts, affect timber stands and soil by compaction, damage trees, or cause erosion. Maintenance and emergency repair activities could also result in direct adverse impacts on forest lands from the removal of vegetation, localized physical disturbance,

Table 6-175 Land-Based Economy Resources within the Anticipated ROW in the East Bear Lake Variation Area

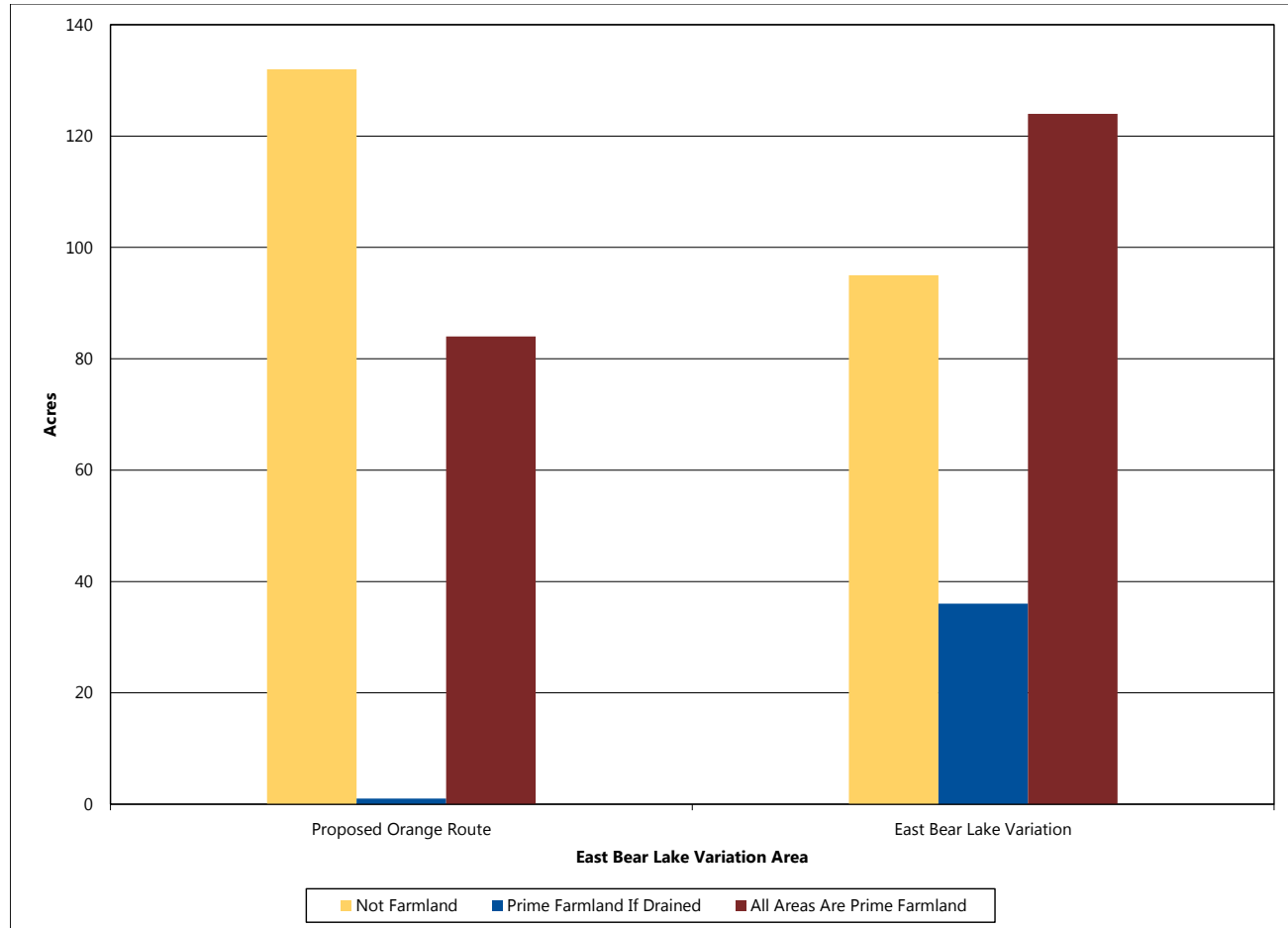
Resource	Type	Evaluation Parameter	East Bear Lake Variation Area	
			Proposed Orange Route	East Bear Lake Variation
Transmission Line	--	Length (mi)	8.9	10.5
Existing Transmission Line ⁽¹⁾	--	Percent of Total Length ⁽²⁾	0	42
Farmland	Not Farmland	Acres within ROW	132	95
	Prime Farmland if Drained	Acres within ROW	1	36
	Farmland of Statewide Importance	Acres within ROW	0	0
	All Areas are Prime Farmland	Acres within ROW	84	124
State Forest	--	Acres within ROW	217	256
State Mineral Leases (active and/or expired/terminated)	--	Acres within ROW	96	193

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154); MnDNR, reference (148); MnDNR 2014, reference (179)

Note(s): Totals may not sum due to rounding

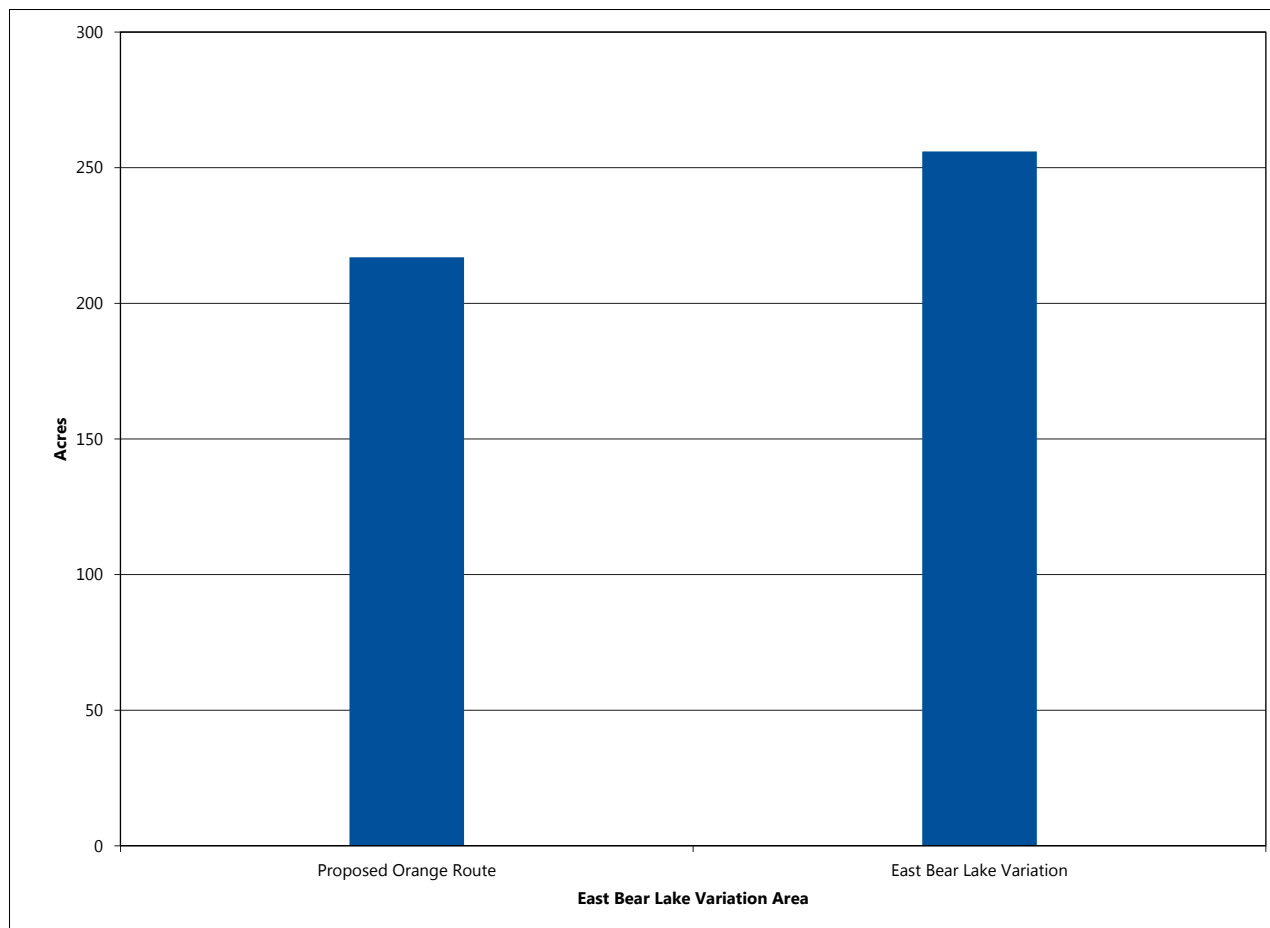
- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-110 Acres of Farmland by Type within the Anticipated ROW in the East Bear Lake Variation Area



Source(s): USDA NRCS 2014, reference (154)

Note(s): Totals may not sum due to rounding

Figure 6-111 Acres of State Forest Land within the Anticipated ROW in the East Bear Lake Variation Area

Source(s): MnDNR 2003, reference (148)

Note(s): Totals may not sum due to rounding

and compaction caused by equipment. Woody vegetation would routinely need to be cleared from the transmission line ROW in order to maintain low-stature vegetation that would not interfere with the operation of the transmission line.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on forestry resources are summarized in Section 5.3.2.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Mining and Mineral Resources

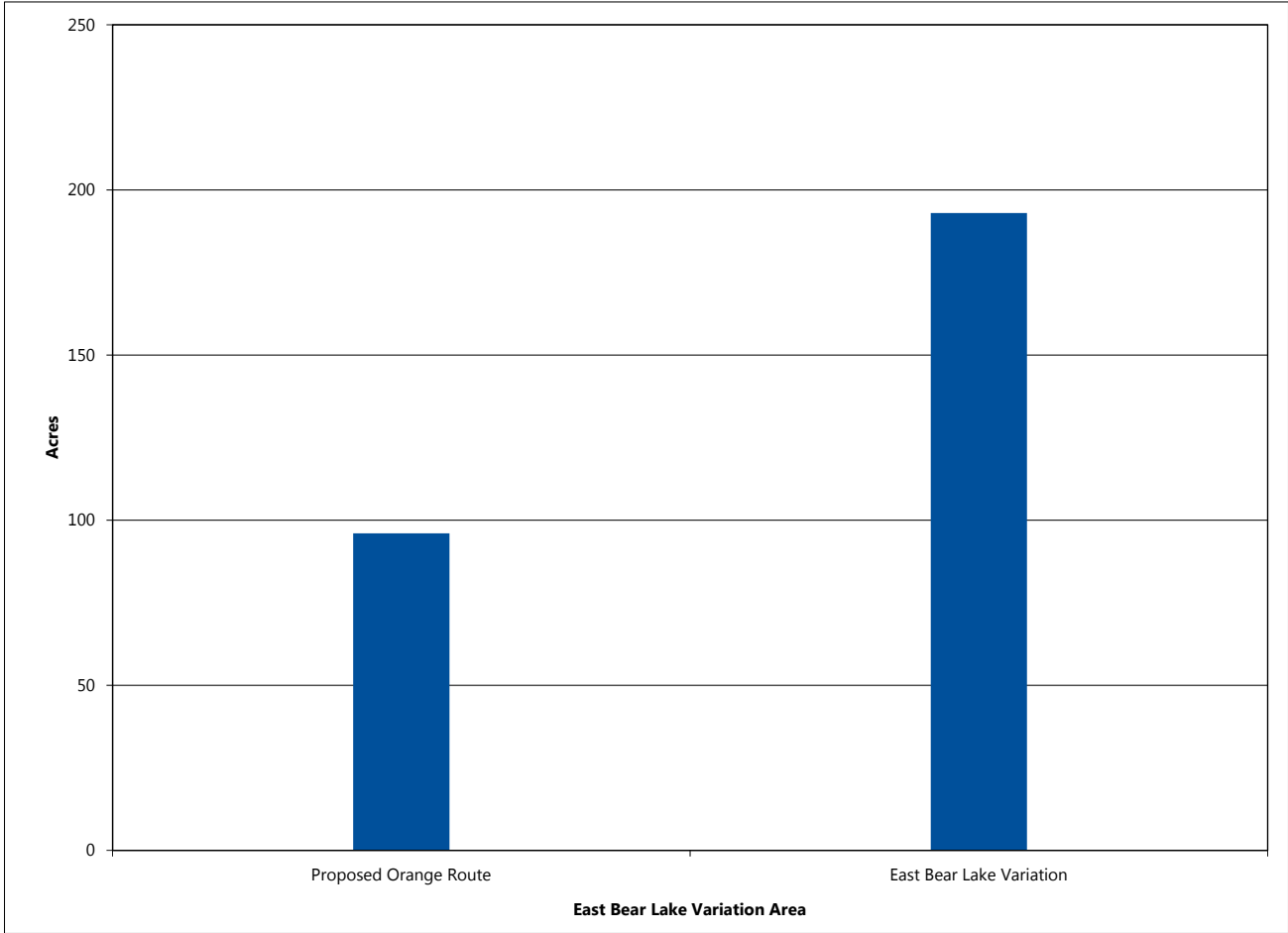
As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the transmission line. Table 6-175, Figure 6-112, and Map 6-56 identify the acreage of mining lands with **active and** terminated/expired state mineral leases that may be impacted in the East Bear Lake Variation Area. There are no known aggregate resources

or current mining lands in the ROI of either the Proposed Orange Route or the East Bear Lake Variation.

Both the Proposed Orange Route and the East Bear Lake Variation would traverse mining lands with terminated/expired state mineral leases, with the East Bear Lake Variation passing through approximately twice as much **active** state mineral lease land as the Proposed Orange Route (Table 6-175, Figure 6-112, and Map 6-56). However, the East Bear Lake Variation would pass through a large portion of **active** state mineral lease land adjacent to an existing transmission line corridor, while the Proposed Orange Route would require the creation of a new corridor. Both the Proposed Orange Route and the East Bear Lake Variation could potentially interfere with future mining activities in this area.

As discussed in Section 5.3.2.3, construction of transmission lines could affect future mining operations if the structures interfere with access to mineable resources or the ability to remove these resources.

Figure 6-112 Acres of State Mineral Leases within the Anticipated ROW in the East Bear Lake Variation Area



Source(s): MnDNR 2014, reference (179)

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on mining and mineral resources are summarized in Section 5.3.2.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.4.2.3 Archaeology and Historic Architectural Sites

Neither the Proposed Orange Route nor the East Bear Lake Variation ROW have previously recorded archaeological or historic resources in the East Bear Lake Variation Area (Map 6-57). **Additionally, no specific Native American resources have been previously recorded within the ROW (direct APE for cultural resources) or within one mile of the anticipated alignment (indirect APE for historic architectural resources or Native American resources) for the Proposed Orange Route and the East Bear Lake Variation in the East Bear Lake Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes**

to identify Native American resources within the direct and indirect APEs for the proposed Project.

However, since the Proposed Orange Route and East Bear Lake Variation have not been surveyed **for cultural resources, archaeological surveys, architectural surveys or inventories, and surveys or inventories for Native American resources** would be required as part of cultural resources investigations conducted in compliance with federal and/or state regulations for archaeological resources and historic architectural properties. These cultural resources investigations would be implemented as part of DOE's **Draft PA (Appendix V)** that would establish a process to identify cultural resources within the APE for the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, or mitigate potential adverse impacts on historic architectural properties as a result of implementation of the proposed Project.

Potential **short-term and long-term** adverse impacts from construction, operation, maintenance, and emergency repair related **activities** to historic and

cultural properties are summarized in Section 5.3.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate adverse impacts to these resources, including TCPs, from the proposed Project.

6.4.2.4 Natural Environment

This section describes the water, vegetation, and wildlife resources within the East Bear Lake Variation Area and the potential impacts from the proposed Project.

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the East Bear Lake Variation Area are summarized in Table 6-176 and shown on Map 6-58. Additional, water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

The number of water crossings, the need to place transmission structures in wetlands, and the quantity of wetland type conversion are the primary water resources impacts that would differ between the Proposed Orange Route and East Bear Lake Variation. Neither the Proposed Orange Route nor the East Bear Lake Variation ROWs contain trout streams, impaired waters, or floodplains.

The Proposed Orange Route and East Bear Lake Variation would each cross the Prairie River and Day Brook; however, the Proposed Orange Route would cross Day Brook three times and result in the most PWI watercourse crossings (Table 6-176). Neither the Proposed Orange Route nor the East Bear Lake Variation would cross PWI waterbodies or wetlands.

The East Bear Lake Variation would require crossing three additional, non-PWI, unnamed watercourses,

while the Proposed Orange Route would not cross any additional non-PWI waters.

It is anticipated that PWI crossings and non-PWI watercourse crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and transmission structures would not be placed within them.

Based on the NWI, the Proposed Orange Route and the East Bear Lake Variation would both require conversion of forested and shrub wetland areas to an herbaceous wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-113, the Proposed Orange Route contains the most combined forested and shrub wetland and would result in the greatest amount of wetland type conversion. While these direct, adverse impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to be minimal because of the amount of surrounding shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1.

The Applicant would need to mitigate for these impacts as summarized in Section 5.3.4.1. The Proposed Orange Route and the East Bear Lake Variation would both require placement of fill in wetlands for construction of transmission structures. This impact cannot be avoided by spanning as wetland crossings in the East Section generally exceed the average spanning length allowable for structures, but impacts to wetlands from permanent fill would be expected to be minimal because of the localized extent of the impact (33 square feet per structure). Due to the number of wetland complexes in the area, it would be expected that the Proposed Orange Route and the East Bear Lake Variation would both require temporary construction access through wetlands, which would be expected to be minimal due to the short-term, localized nature

Table 6-176 Water Resources within the Anticipated ROW in the East Bear Lake Variation Area

Resource	Evaluation Parameter	East Bear Lake Variation Area	
		Proposed Orange Route	East Bear Lake Variation
Transmission Line	Length (mi)	8.9	10.5
PWI Waters ⁽¹⁾	Number of Crossings	4	2
Non-PWI Waters ⁽²⁾	Number of Crossings	0	3
NWI Wetlands	Acres within ROW	104	89

Sources: USFWS 1997, reference (157); USGS 2014, reference (158); USGS 2014, reference (159); Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162)

Note(s): Totals may not sum due to rounding

- (1) PWI waters include watercourses, waterbodies, and wetlands, as described in Chapter 5. The number of each type of PWI water the Proposed Route and variations would cross are described in the text and figure below.
- (2) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.

of the impact, and the Applicant's intended use of minimization measures, such as matting.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on water resources are summarized in Section 5.3.4.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Vegetation

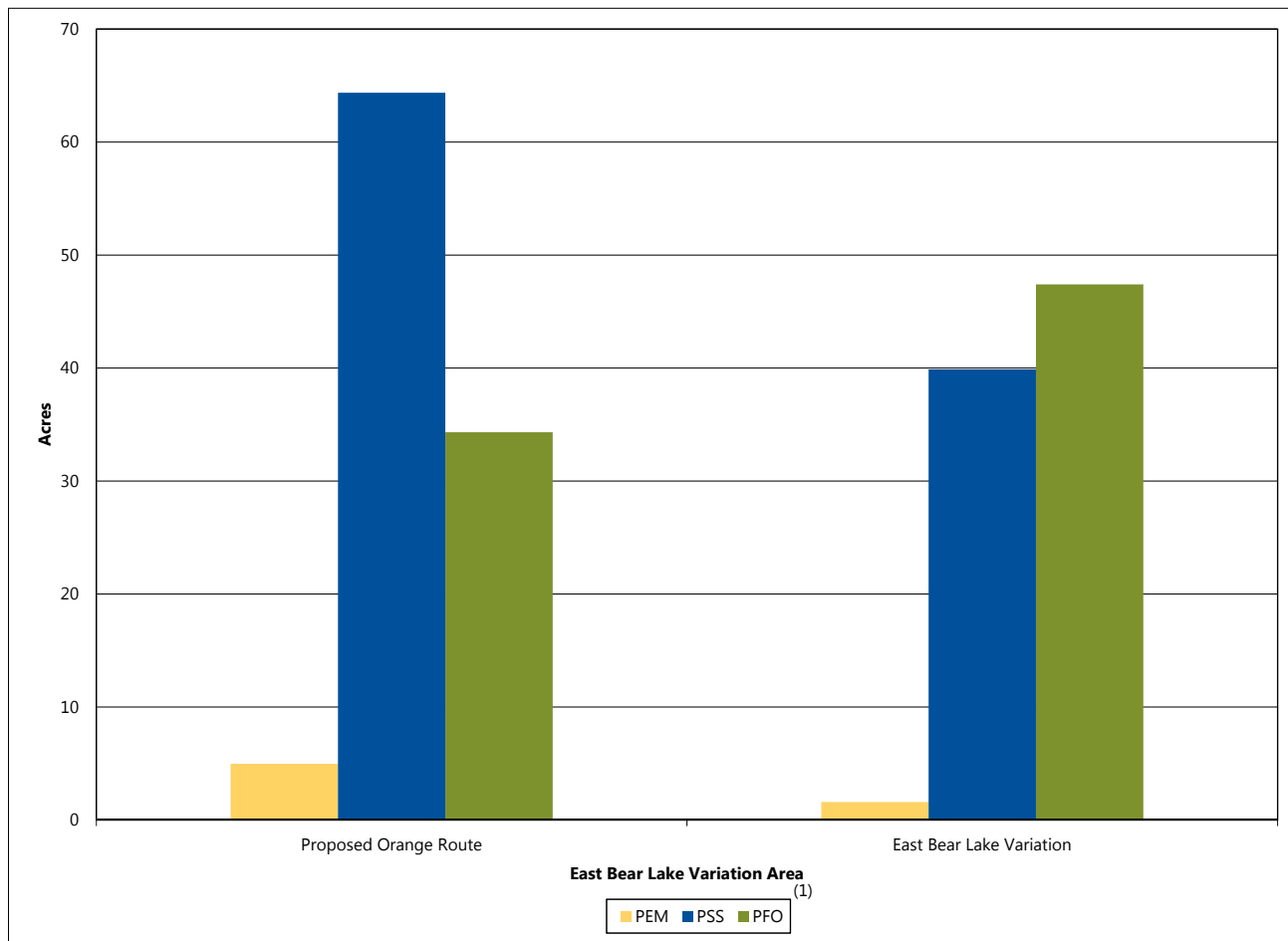
In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the East Bear Variation Area are summarized in Table 6-177 and shown on Maps 5-19 and 6-58. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

The primary impact on vegetation that would differ between the Proposed Orange Route and East

Bear Lake Variation is the loss or fragmentation of forest. As discussed in Section 5.3.4.2, the Applicant would permanently clear woody vegetation from the ROW during construction and the ROW would be maintained as low-stature vegetation in order to reduce interference with the maintenance and function of the transmission line.

As indicated in Table 6-177 and Figure 6-114, the East Bear Lake Variation would pass through more forested land, including state forest land, relative to the Proposed Orange Route, therefore resulting in more permanent removal of forested vegetation. Although the Proposed Orange Route is shorter in length, it would require creation of new corridor for its entire length, while the East Bear Lake Variation would parallel an existing transmission line corridor for over 40 percent of its length (Table 6-177). Because of this, the East Bear Lake Variation would likely result in less impact on intact forested areas. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant

Figure 6-113 Acres of Wetland by Type within the Anticipated ROW in the East Bear Lake Variation Area



Source(s): USFWS 1997, reference (157)

Note(s): Totals may not sum due to rounding

(1) Palustrine emergent wetland (PEM), palustrine shrub wetland (PSS), palustrine forested wetland (PFO).

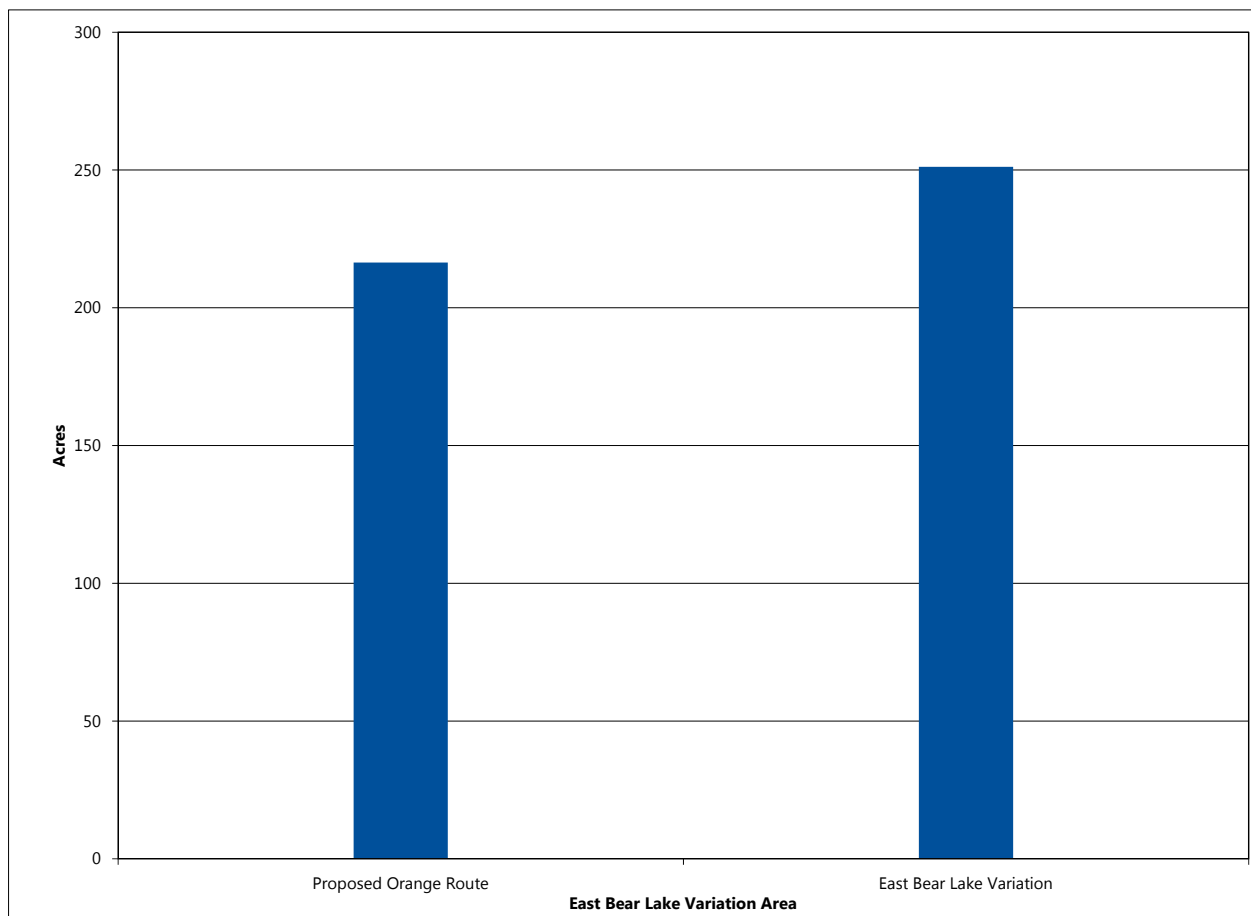
Table 6-177 Vegetation Resources within the Anticipated ROW in the East Bear Lake Variation Area

Resource	Evaluation Parameter	East Bear Lake Variation Area	
		Proposed Orange Route	East Bear Lake Variation
Transmission Line	Length (mi)	8.9	10.5
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	0	42
State Forest	Acres within ROW	217	256
Total Forested GAP Land Cover	Acres within ROW	216	251
GAP Land Cover - Dominant Types⁽³⁾			
North American Boreal Forest	Acres within ROW	103	140
North American Boreal Flooded and Swamp Forest	Acres within ROW	94	77

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2003, reference (148); USGS 2001, reference (151)

Note(s): Totals may not sum due to rounding

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) Data presented here only includes dominant GAP types; see Appendix E for additional land cover types within the ROW.

Figure 6-114 Acres of all Forested GAP Land Cover Types within the Anticipated ROW in the East Bear Lake Variation Area


Source(s): USGS 2001, reference (151)

Note(s): Totals may not sum due to rounding

in the region surrounding the proposed Project (Map 5-19).

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on vegetation resources are summarized in Section 5.3.4.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Wildlife resources in the East Bear Variation Area consist of natural habitat, including forest, wetlands, and open areas (Map 6-58). Data associated with potential impacts on wildlife resources in the East Bear Variation Area are summarized in Table 6-178.

The primary impacts on wildlife resources that would differ between the Proposed Orange Route and East Bear Lake Variation include loss and fragmentation of natural habitat and proximity of the Proposed Orange Route and East Bear Lake Variation to these areas. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor or create new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.4.2.4 (Vegetation) summarizes potential impacts on forested vegetation from the Proposed Orange Route and East Bear Lake Variation.

Although the Proposed Orange Route is shorter in length, it would require creation of new corridor for its entire length, while the East Bear Lake Variation would parallel an existing transmission line corridor for just under half of its length (Table 6-178; Map 6-58). Because of this, the East Bear Lake Variation would result in less fragmentation of forested habitats, and subsequent displacement

of wildlife species associated with those forest communities.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on wildlife resources are summarized in Section 5.3.4.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project. Section 6.2.1.4 (Wildlife) discusses additional suggested measures to avoid, minimize, or mitigate impacts on wildlife are summarized.

6.4.2.5 Rare and Unique Natural Resources

Rare and unique natural resources are divided into rare species and rare communities. Rare species encompass federally listed or state endangered, threatened, or special concern species while rare communities may include state-designated features, such as SNAs, MBS Sites of Biodiversity Significance, MnDNR High Conservation Value Forest, MnDNR Ecologically Important Lowland Conifer stands, and MBS native plant communities.

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations. Data related to rare species in the East Bear Variation Area are summarized in Table 6-179; additional data on rare species, such as the presence of MnDNR tracked species, is provided in Appendix F. As a condition of the license agreement with MnDNR for access to the NHIS database, data pertaining to the documented locations of rare species are not shown on a map.

Proximity of state endangered, threatened, or special concern species is similar between the Proposed Orange Route and the East Bear Lake Variation. As discussed in Section 5.3.5, potential long-term impacts on rare species from the proposed Project

Table 6-178 Information Relevant to Wildlife Resources in the Vicinity of the East Bear Variation Area

Resource	Evaluation Parameter	East Bear Lake Variation Area	
		Proposed Orange Route	East Bear Lake Variation
Transmission Line	Length (mi)	8.9	10.5
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	0	42

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145)

Note(s): Totals may not sum due to rounding

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation from construction.

As indicated in Table 6-179, two state-concern mussel species have been documented within one mile of the Proposed Orange Route, one of which was also documented within one mile of the East Bear Lake Variation. Because it is anticipated that all watercourses would be spanned, impacts to these rare mussels are not expected. The state-special concern necklace spike sedge was documented within one mile of both the Proposed Orange Route and East Bear Lake Variation. Although the Proposed Orange Route is shorter in length, it would require establishment of new corridor for its entire length, while the East Bear Lake Variation would parallel an existing transmission line corridor for just under half of its length (Map 6-59). Clearing of forested areas to create new corridor could have impacts on rare species associated with forest or shrub communities, such as the necklace spike sedge. Because the Proposed Orange Route would require creation of new corridor for its entire length it would likely result in more impacts on rare species relative to the East Bear Lake Variation; however, the full extent of potential impacts from either the Proposed Orange Route or East Bear Lake Variation cannot be determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. The MN PUC Route Permit could also require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

Any indirect impacts to rare species from the proposed Project are expected to be minimal because of the amount of surrounding habitat. Through use of Applicant proposed avoidance and minimization measures, direct impacts to rare species are not expected. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment

has been prepared to assess potential impacts on federally listed species (Appendix R).

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on rare species are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Rare Communities

The ROI for the analysis of impacts to rare communities was described within Section 5.3.5 and includes the ROW of the proposed transmission line. Data related to rare communities and resources in the East Bear Variation Area are summarized in Table 6-180 and shown on Map 6-59; additional, more detailed data on rare communities and resources is provided in Appendix E.

The primary impact on rare communities and resources that would differ between the Proposed Orange Route and East Bear Lake Variation is the loss or conversion of native vegetation. As discussed in Section 5.3.5, the Applicant would permanently remove vegetation at each structure footprint and within portions of the ROW that are currently dominated by forest or other woody vegetation.

As indicated on Map 6-59 and in Table 6-180, the East Bear Lake Variation would pass through more MBS Sites of Biodiversity Significance. However, the East Bear Lake Variation would parallel an existing transmission line corridor for over 40 percent of its length, while the Proposed Orange Route would require creation of new corridor for its entire length. Because of this, the Proposed Orange Route would result in more impacts on native vegetation and fragmentation of intact forest in areas where forest vegetation is present.

The rare communities and resources listed in Table 6-180 and detailed above show that the

Table 6-179 Rare Species Documented within One Mile of the Anticipated ROW in the East Bear Variation Area

Scientific Name ⁽¹⁾	Common Name	Federal Status	State Status	Type	East Bear Lake Variation Area	
					Proposed Orange Route	East Bear Lake Variation
<i>Carex ormostachya</i>	Necklace Spike Sedge	None	Special Concern	Vascular Plant	X	X
<i>Lasmigona compressa</i>	Creek Heelsplitter	None	Special Concern	Mussel	X	X
<i>Ligumia recta</i>	Black Sandshell	None	Special Concern	Mussel	X	

Source(s): MnDNR 2015, reference (132)

(1) Canada lynx and gray wolf records are not documented in the NHIS database.

Table 6-180 Rare Communities and Resources within the Vicinity of the East Bear Lake Variation Area

Resource	Evaluation Parameter	East Bear Lake Variation Area	
		Proposed Orange Route	East Bear Lake Variation
Transmission Line	Length (mi)	8.9	10.5
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	0	42
MBS Sites of Biodiversity Significance ⁽³⁾	Acres within ROW	217	255

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MBS 2015, reference (167)

Note(s): Totals may not sum due to rounding

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) MBS Sites of Biodiversity Significance data are preliminary in this portion of the proposed Project. Because of the preliminary status and/or unknown ranks, biodiversity significance ranks are not distinguished from one another here.

proposed Project may result in direct, long-term, localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional abundance and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities are expected to be significant if localized adverse impacts would result in a broader regional depletion of certain rare communities. The MN PUC Route Permit could require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on rare communities are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.4.2.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-60 shows areas where the proposed route and variations would parallel corridors with existing transportation, transmission line, or other linear features in the East Bear Lake Variation Area.

Table 6-181 identifies the percentage of total transmission line length the Proposed Orange Route and East Bear Lake Variation parallel an existing corridor or linear feature in the East Bear Lake WMA Variation Area.

The Proposed Orange Route would parallel existing corridors for over half of the length (Figure 6-115). The East Bear Lake Variation would parallel existing transmission line corridor for just under half of its length.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on corridor sharing are summarized in Section 5.3.6. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on corridor sharing from the proposed Project.

6.4.2.7 Electrical System Reliability

As explained in Section 5.3.7, the ROI for Electrical System Reliability was determined to be the corridors for the existing transmission lines. Data related to electrical system reliability in the East Bear Lake Variation Area are shown on Map 6-60.

The Proposed Orange Route would not parallel an existing transmission line in the East Bear Lake Variation Area. The East Bear Lake Variation would parallel 230 kV and 500 kV transmission lines for approximately 42 percent of their length in the northern portion of the East Bear Lake Variation Area (Table 6-181); therefore, three transmission lines would be in adjacent corridors.

The configuration may decrease the reliability of the proposed Project. When facilities are located in close proximity, there is a greater risk that a single event can take out multiple lines. Additionally, the close proximity of the lines can make repairing the lines more difficult. These difficulties could increase outage times, should an outage occur. Adverse impacts are possible as a result of the construction of the construction and operation of three high-voltage transmission lines under one variation in the East Section.

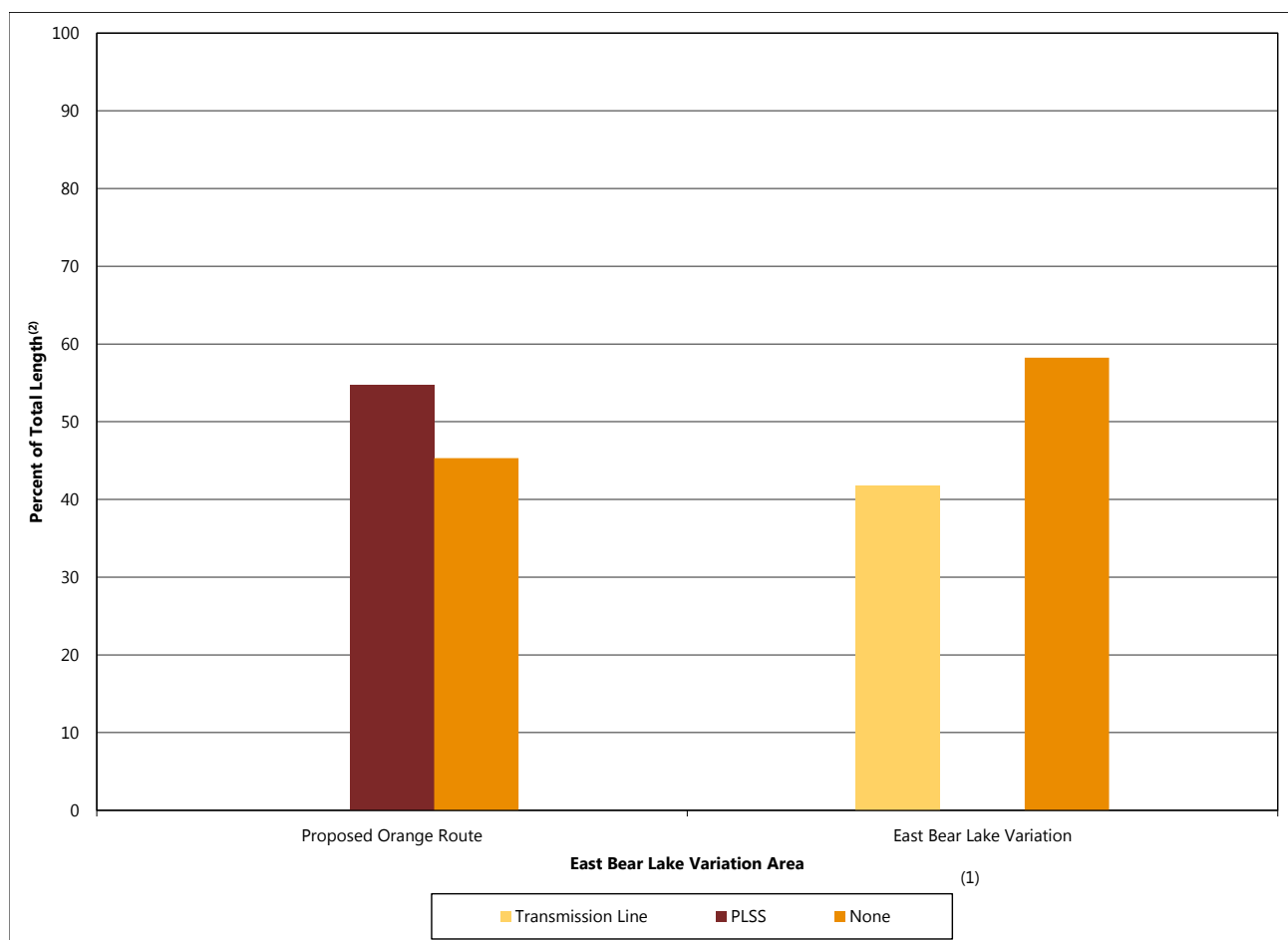
Table 6-181 Corridor Sharing in the East Bear Lake Variation Area

Feature Sharing Corridor ⁽¹⁾	Evaluation Parameter	East Bear Lake Variation Area	
		Proposed Orange Route	East Bear Lake Variation
Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field line, PLSS)	Percent of Total Length ⁽²⁾	0	42
PLSS Only	Percent of Total Length ⁽²⁾	55	0
None	Percent of Total Length ⁽²⁾	45	58

Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

Note(s): Totals may not sum due to rounding

- (1) More than one feature may share the corridor; the primary feature within the corridor is identified, other features that may share the corridor are listed in parenthesis. Appendix E provides a detailed summary of all shared features.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-115 Corridor Sharing in the East Bear Lake Variation Area


Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

Note(s): Totals may not sum due to rounding

- (1) Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field line, PLSS).
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on electrical system reliability are summarized in Section 5.3.7. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on electrical system reliability.

6.4.2.8 Costs of Constructing, Operating, and Maintaining the Facility which are Dependent on Design and Route

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-182 summarizes the costs associated with constructing the Proposed Orange Route and East Bear Lake Variation in the East Bear Lake Variation Area. As indicated in Table 6-182, the East Bear Lake Variation would cost more to construct relative to the Proposed Orange Route.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$14,000 to \$17,000 annually for these alternatives in the East Bear Lake Variation Area.

6.4.3 Balsam Variation Area

The Balsam Variation Area encompasses three route alternatives: the Proposed Blue Route, Proposed Orange Route, and the Balsam Variation. This section provides a comparison of the potential impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project within the Balsam Variation Area, depending on the route or variation considered.

6.4.3.1 Human Settlement

This section describes the aesthetic resources and zoning and land use compatibility within the Balsam Variation Area and the potential impacts from the proposed Project.

Aesthetics

As described in the Aesthetics discussion for the Effie Variation Area (see Section 6.4.1.1), impacts on aesthetic resources would be determined based largely on the level of increased contrast produced by the proposed Project in views by sensitive viewers. Residences and other aesthetic resources within 1,500 feet of the anticipated alignment would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI. Data related to aesthetic resources in the Balsam Variation Area are summarized in Table 6-183 and shown on Maps 6-61, 6-62, 6-63, and 6-65.

As indicated in Table 6-183 for the Balsam Variation Area, the Proposed Blue Route, Proposed Orange Route, and Balsam Variation would cross or be located within 1,500 feet of aesthetic resources with high visual sensitivity, including snowmobile trails and historic architectural sites (Map 6-62 and Map 6-65). The Proposed Blue Route would cross two snowmobile trails and be located within one mile (5, 280 ft) of 13 historic architectural sites (Map 6-62 and Map 6-65). The Proposed Orange Route would cross two snowmobile trails and be located within one mile of 24 historic architectural sites (Map 6-62 and Map 6-65). The Balsam Variation would cross three snowmobile trails and be located within one mile of 28 historic architectural sites (Map 6-62 and Map 6-65). Overall, the Proposed Blue Route would affect fewer aesthetic resources than the other alternatives. The Proposed Orange Route would be located near a reserve with recreation facilities located along the east side of Scenic Highway 7 near Balsam Memorial Hall, to the northeast of Snaptail Lake (6-63). This recreation area has a large fenced ball field, play structures, tennis courts, pavilions, and other recreation and community facilities and is an aesthetic resource with high visual sensitivity. Viewpoint 03 in Appendix N shows the existing view looking east-northeast from a position next to the ball field. Viewpoint 03 in Appendix N shows the existing view looking east-northeast from a position next to the ball field. The first picture for Viewpoint 03 in Appendix N shows the existing view looking east-northeast from a position next to the ball

Table 6-182 Construction Costs in the East Bear Lake Variation Area

Variation Area	Name in the EIS	Cost (Total)	Average Cost (per mile)	Length (mi)
East Bear Lake	Proposed Orange Route	\$9,736,790	\$1,090,346	8.9
	East Bear Lake Variation	\$13,279,079	\$1,264,674	10.5

Source(s): Minnesota Power 2015, reference (9)

Table 6-183 Aesthetic Resources within the ROI in the Balsam Variation Area

Resource	Evaluation Parameter ⁽¹⁾	Balsam Variation Area		
		Proposed Blue Route	Proposed Orange Route	Balsam Variation
Transmission Line	Length (mi)	12.9	13.7	17.8
Existing Transmission Line ⁽²⁾	Percent of Total Length ⁽³⁾	15	14	0
Abandoned Transmission Line	Percent of Total Length ⁽³⁾	0	22	66
Residences	Count within 0–500 ft	0	2	2
	Count within 0–1,000 ft	3	10	6
	Count within 0–1,500 ft	7	21	12
Historic Architectural Sites	Count within 0–1,500 ft	0	0	4
	Count within 0–5,280 ft	13	24	28
Snowmobile Trails	Count within 0–1,500 ft	2	2	3

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Minnesota Power 2014, reference (146); SHPO 2014, reference (147); MnDNR 2010, reference (150)

Note(s): Totals may not sum due to rounding

- (1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0-500 ft includes 500 ft on each side of the anticipated alignment.
- (2) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

field. The second picture shows Viewpoint 03 as a photosimulation of the same view after construction of the Proposed Orange Route. The third figure shows Viewpoint 03c a photosimulation of the same view after construction of the Proposed Orange Route, with the transmission line and structures indicated in yellow. In this view, the Proposed Orange Route would be located approximately 0.25 mile away. As indicated in the photosimulation, the Proposed Orange Route would be screened from view from this viewpoint by dense forest and therefore the visual character and quality of views from this area is not diminished.

The Proposed Blue Route would be located within 1,500 feet of the least number of residences (seven residences, three of which are located within 1,000 feet of the anticipated alignment) which have high visual sensitivity, whereas the Proposed Orange Route could potentially affect the most residences as 21 residences are within 1,500 feet of the anticipated alignment, including 10 within 1,000 feet and two within 500 feet. The Balsam Variation could potentially affect 12 residences, six of which are within 1,000 feet and two are within 500 feet of the anticipated alignment (Figure 6-116). Of the three routes in the Balsam Variation Area, the Proposed Blue Route would affect fewer residences (seven) and snowmobile trails within 1,500 feet (two) and fewer historic architectural sites within one mile (13).

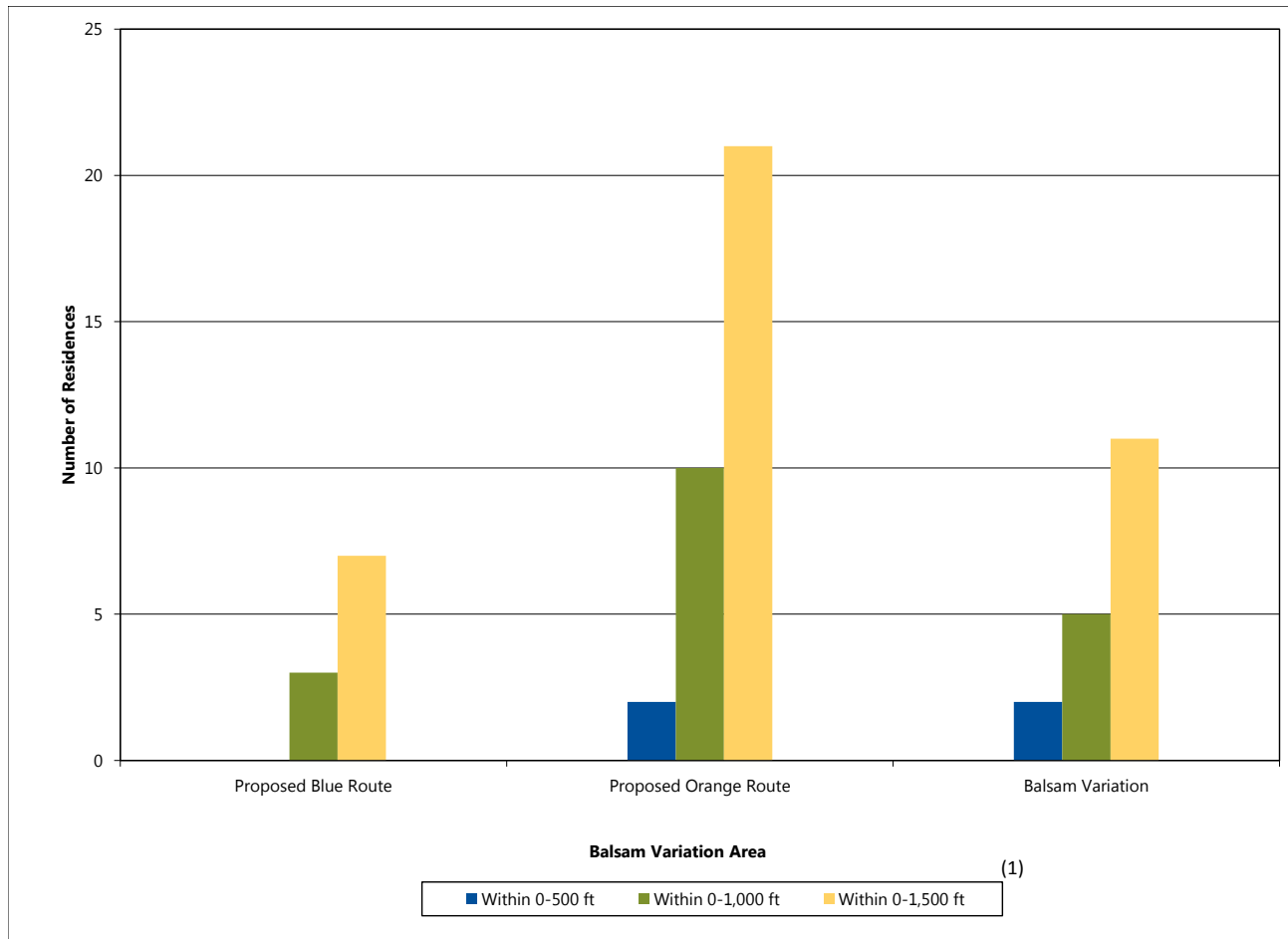
The Balsam Variation is longer (17.8 miles) than either the Proposed Blue Route (12.9 miles) or the

Proposed Orange Route (Table 6-183). In addition, the Balsam Variation does not parallel any existing large transmission lines and would require new corridors to be cleared. The Proposed Blue Route and Proposed Orange Route each parallel an existing 69 kV or 115 kV transmission line for a short distance, 15 and 14 percent, respectively (Table 6-183). By paralleling an existing large transmission line corridor, the Proposed Blue Route and Proposed Orange Route would produce less contrast than the Balsam Variation.

Overall, the Proposed Blue Route and Proposed Orange Route would produce less contrast than the Balsam Variation due to both being shorter and paralleling an existing large transmission line for part of their lengths. However, the Proposed Blue Route also affects fewer aesthetic resources (13 historic architectural sites, two snowmobile trails) and residences (seven) with high viewer sensitivity than either the Balsam Variation or the Proposed Orange Route. For these reasons, the Proposed Blue Route would result in less aesthetic impact than either the Proposed Orange Route or the Balsam Variation in the Balsam Variation Area.

Although the Proposed Blue Route and Proposed Orange Route are moderately short in length, they parallel existing transmission lines for part of their lengths and affect numerous residences and other sensitive visual resources. For these reasons, potential aesthetic impacts of the Proposed Blue Route and Proposed Orange Route are expected

Figure 6-116 Residences within the ROI in the Balsam Variation Area



Source(s): Minnesota Power 2014, reference (146)

Note(s): Totals may not sum due to rounding

(1) Area/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

to be significant. Because the Balsam Variation is longer in length, does not parallel an existing large transmission line, and affects numerous residences and other sensitive visual resources, potential aesthetic impacts of the Balsam Variation are also expected to be significant.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on aesthetics are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Land Use Compatibility

As explained in Section 5.3.1.1, the ROI for Land Use Compatibility was determined to be 1,500 feet from the anticipated alignments of the proposed Project.

Land Uses

Table 6-184 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignments of the Proposed Blue Route, Proposed Orange Route, and Balsam Variation in the Balsam Variation Area. Generally, the percentage of each land use is representative of what is present within the ROW. The various land uses present in the Balsam Variation Area are shown in Map 5-19 and residences, churches, cemeteries, and airports near the Proposed Blue Route, Proposed Orange Route, and Balsam Variation are shown on Map 6-61.

The Proposed Blue Route, Proposed Orange Route, and Balsam Variation ROI are both primarily composed of forested and/or swamp land (Table 6-184). The Balsam Variation ROW contains a greater amount of forested/swamp land, developed or disturbed land, and agricultural land than the Proposed Blue Route and the Proposed Orange Route.

Table 6-184 Land Uses within the ROI in the Balsam Variation Area

Resource	Type ⁽¹⁾	Evaluation Parameter ⁽²⁾	Balsam Variation Area		
			Proposed Blue Route	Proposed Orange Route	Balsam Variation
GAP Land Cover Vegetation Class Level - Division 4	Total	Acres within 0–1,500 ft	4,859	5,130	6,638
	Developed or Disturbed	Acres within 0–1,500 ft	169	212	291
	Agricultural	Acres within 0–1,500 ft	4	70	72
	Forested and/or Swamp	Acres within 0–1,500 ft	4,541	4,828	6,189
	Other	Acres within 0–1,500 ft	145	20	86

Source(s): USGS 2001, reference (151)

Note(s): Totals may not sum due to rounding

- (1) Other category includes: Open water, Great Plains Grassland & Shrubland and Introduced & Semi Natural Vegetation. See detailed summary of all types in Appendix E.
- (2) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

Table 6-185 Land Ownership/Management within the Anticipated ROW in the Balsam Variation Area

Resource	Type	Evaluation Parameter	Balsam Variation Area		
			Proposed Blue Route	Proposed Orange Route	Balsam Variation
Total Lands	--	Acres within ROW	314	332	433
State Fee Lands ⁽¹⁾ Total	--	Acres within ROW	55	38	107
State Fee Lands ⁽¹⁾ by Type	Consolidated Conservation	Acres within ROW	0	0	0
	Other - Acquired, Tax Forfeit, Volstead	Acres within ROW	53	38	50
	Trust Fund	Acres within ROW	2	0	57
	Federal - State Lease	Acres within ROW	0	0	0
State Conservation Easements	--	Acres within ROW	0	3	0
Private Lands ⁽²⁾	--	Acres within ROW	260	294	326

Source(s): MnDNR 2014, reference (152), MnDNR 2010, reference (184)

Note(s): Totals may not sum due to rounding

- (1) This dataset represents state land ownership using public land survey quarter-quarter sections as the smallest unit. In some cases, multiple state lands are located within a single quarter-quarter section. Therefore, features may be duplicated and the analysis results may over-represent potential impacts.
- (2) Acreage for private lands was calculated as the difference between total lands and public lands.

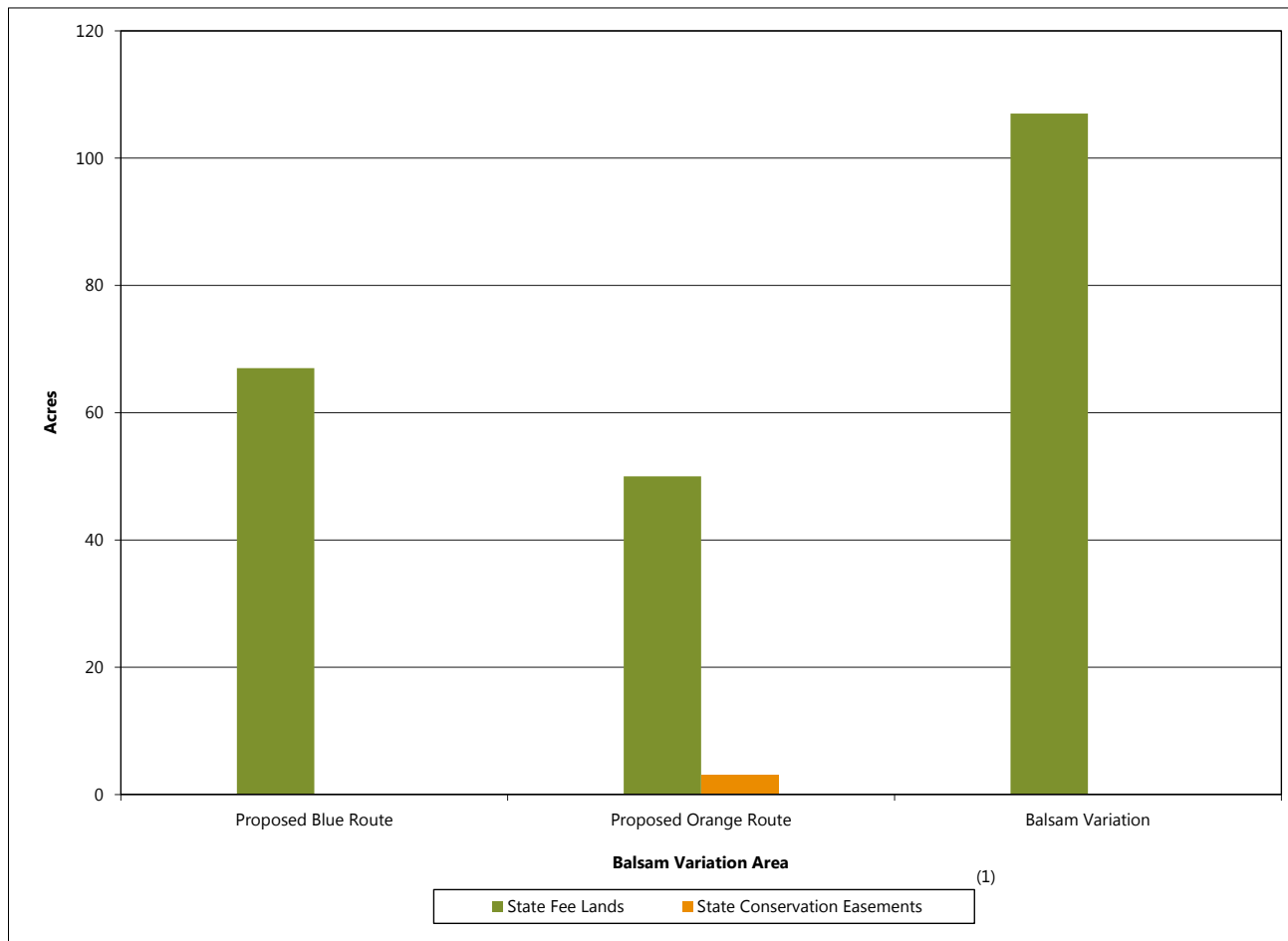
Land Ownership and Management

As shown in Table 6-185 and Figure 6-117, no state forest land would be located in the proposed routes or variation; however, each would contain some state fee land, with the greatest amount located in the Balsam Variation. No impacts to county lands, or USFWS Interest Lands would occur under the Proposed Blue Route, Proposed Orange Route, or Balsam Variation. The Proposed Orange Route would impact a few acres of state conservation land, while the Proposed Blue Route and Balsam Variation would not impact this land type.

The Proposed Blue Route and Proposed Orange Route would both parallel an existing corridor and road/trail for approximately 20 percent of their total length (see Section 6.4.3.6). The Balsam Variation would parallel a road/trail for approximately 36 percent of its length.

Impacts to land use from the proposed Project in the Balsam Variation Area would be similar to those described in Section 6.2.1.1. The Proposed Blue Route, Proposed Orange Route, and Balsam Variation would all result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp

Figure 6-117 Public Land Ownership/Management within the ROI in the Balsam Variation Area



Source(s): MnDNR 2014, reference (152); MnDNR 2010, reference (184)

Note(s): Totals may not sum due to rounding

- (1) This dataset represents state land ownership using public land survey quarter-quarter sections as the smallest unit. In some cases, multiple state lands are located within a single quarter-quarter section. Therefore, features may be duplicated and the analysis results may over-represent potential impacts.

lands in the surrounding area; so these changes are expected to have a minimal impact on land use. The length of the route that would parallel an existing corridor is also important. The Proposed Orange Route avoids more state forest and state fee lands than the Proposed Blue Route or the Balsam Variation thereby avoiding long-term changes to land use. However, the Balsam Variation parallel an existing road/trail for a greater percentage of its length than either the Proposed Blue Route or Proposed Orange Route.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on land use are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.4.3.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the Balsam Lake Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the Balsam Variation Area are summarized in Table 6-186.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-186 and Figure 6-118 show the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the Proposed Blue Route, Proposed Orange Route, and Balsam Variation in the ROI.

Table 6-186 Land-Based Economy Resources within the Anticipated ROW in the Balsam Variation Area

Resource	Type	Evaluation Parameter	Balsam Variation Area		
			Proposed Blue Route	Proposed Orange Route	Balsam Variation
Transmission Line	--	Length (mi)	12.9	13.7	17.8
Existing Transmission Line ⁽¹⁾	--	Percent of Total Length ⁽²⁾	15	14	0
Abandon Transmission Line	--	Percent of Total Length ⁽²⁾	0	22	66
Farmland	Not Farmland	Acres within ROW	109	115	230
	Prime Farmland if Drained	Acres within ROW	50	46	61
	Farmland of Statewide Importance	Acres within ROW	0	12	1
	All Areas are Prime Farmland	Acres within ROW	156	159	141
State Mineral Leases (active and/or expired/terminated)	--	Acres within ROW	0	0	89

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154); MnDNR 2014, reference (179)

Note(s): Totals may not sum due to rounding

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

The Proposed Orange Route, which would parallel existing corridors for approximately one third of its length, would impact the most acres of farmland (Figure 6-118). While the Proposed Orange Route would have the greatest impact on farmland of statewide importance, the Proposed Blue Route would not have any impact on these farmlands. The Balsam Variation, which would be located in an abandoned transmission line corridor for approximately two-thirds of its length, would be expected to have the fewest impacts on farmland.

As discussed in Section 5.3.2.1, construction activities could limit the use of fields or could affect crops and soil by compacting soil, generating dust, damaging crops or drain tile, or causing erosion. Construction activities would also cause long-term adverse impacts to agriculture by the potential loss of income due to the removal of farmland for transmission line structures and associated facilities. Maintenance and emergency repair activities could result in direct adverse impacts on farmlands from the removal of crops, localized physical disturbance, and soil compaction caused by equipment.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on agricultural resources are summarized in Section 5.3.2.1. Section 2.13 summarizes Applicant-

proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

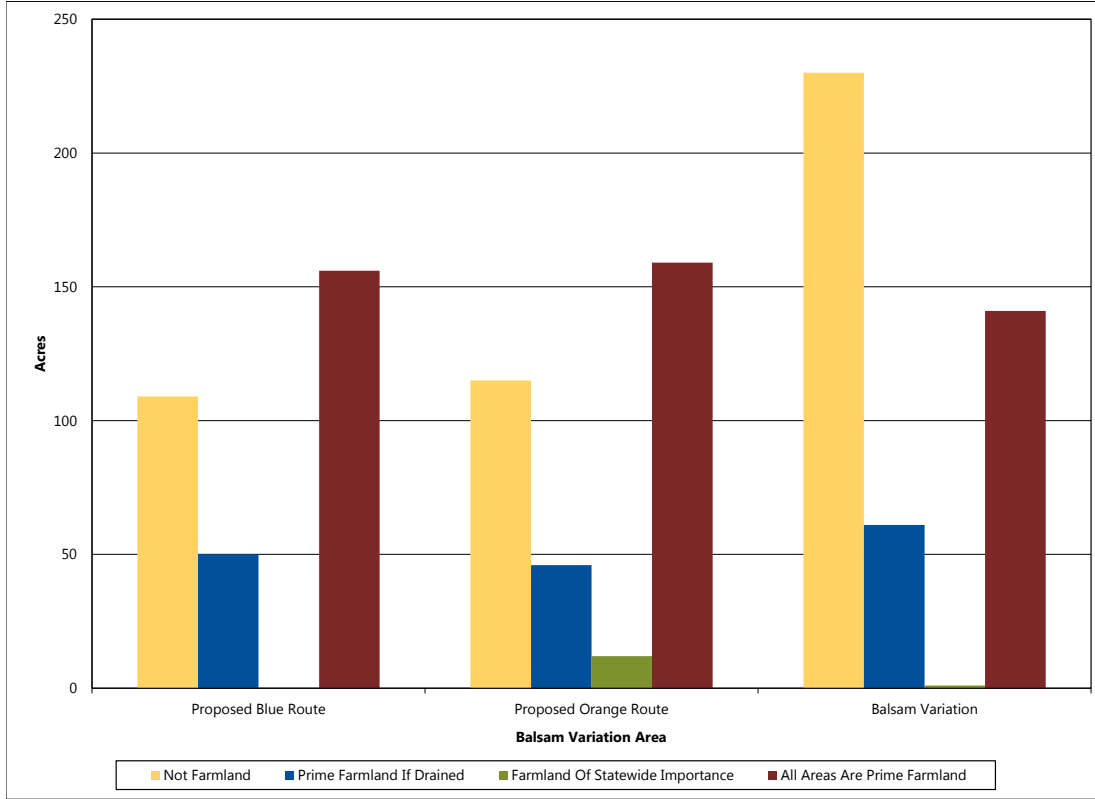
Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line. Table 6-186 identifies the acreage of state forest land that would be impacted in the ROI by the Proposed Blue Route, Proposed Orange Route, and Balsam Variation. There are no USDA-USFS national forest lands or state forest lands within the ROI of the Proposed Blue Route, Proposed Orange Route, and Balsam Variation in the Balsam Variation Area.

Mining and Mineral Resources

As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the transmission line. Table 6-186, Figure 6-119, and Map 6-61 identify the acreage of mining lands with **active and** terminated/expired state mineral leases that may be impacted in the Balsam Variation Area. There are no known aggregate resources in the ROI of either the proposed routes or the Balsam Variation. **The southern portion of the Balsam Variation crosses known mineral resources leased by the MnDNR.**

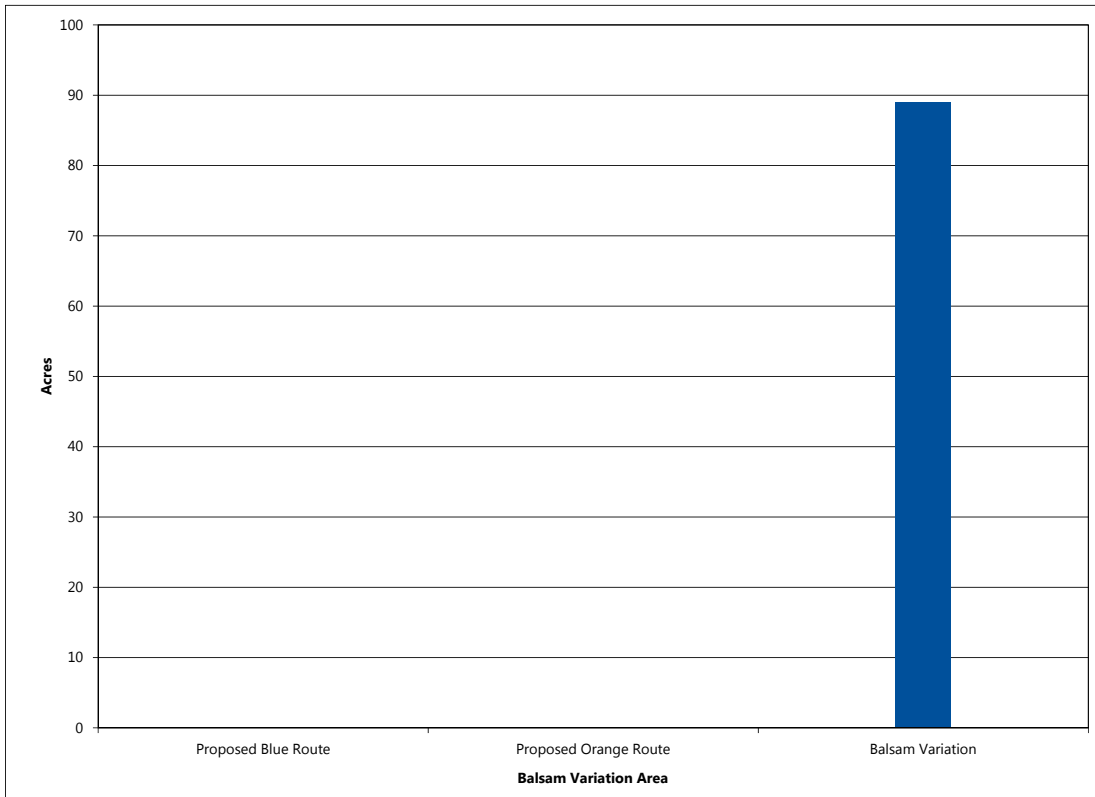
Figure 6-118 Acres of Farmland by Type within the Anticipated ROW in the Balsam Variation Area



Source(s): USDA NRCS 2014, reference (154)

Note(s): Totals may not sum due to rounding

Figure 6-119 Acres of State Mineral Leases within the Anticipated ROW in the Balsam Variation Area



Source(s): MnDNR 2014, reference (179)

The Balsam Variation would traverse mining lands with **active and** terminated/expired state mineral leases associated with the Mesabi Iron Range, while the two proposed routes would not traverse any mining lands with **active and terminated/expired** state mineral leases (Table 6-186, Figure 6-119, and Map 6-61). The Balsam Variation could potentially interfere with mining activities in this area.

As discussed in Section 5.3.2.3, construction of transmission lines could affect future mining operations if the structures **encumber the lease or** interfere with access to mineable resources or the ability to remove these resources. **If a conflict were to arise, the transmission line and structures would need to be relocated to allow access to the mineral resources.**

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on mining and mineral resources are summarized in Section 5.3.2.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.4.3.3 Archaeology and Historic Architectural Sites

As described in Section 6.2.1.3, the APE for potential direct impacts to archaeological and historic architectural resources includes the ROW of the proposed transmission line; however, potential indirect impacts to historic architectural sites are evaluated within one mile from the anticipated alignment since visual intrusions can change the context and setting of historic architectural sites.

Table 6-187 provides a summary of the previously recorded archaeological **sites** and historic architectural resources within the ROW and within 1,500 feet and one mile of the anticipated alignments for the Proposed Blue Route, Proposed Orange Route,

and Balsam Variation in the Balsam Variation Area (Map 6-62). A more detailed description of these resources can be found in the Phase IA cultural resources survey report located in Appendix P.

To date, no specific Native American resources have been previously recorded within the ROW (direct APE for cultural resources) or within one mile of the anticipated alignment (indirect APE for historic architectural resources or Native American resources) for the Proposed Blue Route, Proposed Orange Route, and Balsam Variation in the Balsam Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources within the direct and indirect APEs for the proposed Project.

Within the Balsam Variation Area, there are no known archaeological or historic architectural **resources** located within the ROW of the Proposed Blue Route, Proposed Orange Route, or Balsam Variation, although cultural resource investigations have not yet occurred for the Proposed Route or variations. The Balsam Variation has the most sites architectural sites when compared to those potentially present within the Proposed Blue Route and Proposed Orange Route indirect APEs. While several of the historic architectural **resources** located within the indirect APE of the routes and variation are recommended as not NRHP-eligible, there are numerous properties that have either not been evaluated for **NRHP-eligibility** or were recommended potentially NRHP eligible, recommended NRHP eligible, or considered NRHP eligible.

There is currently no known potential for direct, long-term adverse **impacts** from the proposed Project as there are no previously recorded archaeological **sites** and **historic architectural** resources within the Balsam Variation Area direct APE. Indirect, long-term, adverse visual **impacts to previously recorded historic architectural resources**

Table 6-187 Archaeological and Historic Resources within the Balsam Variation Area

Resource	Evaluation Parameter ⁽¹⁾	Balsam Variation Area		
		Proposed Blue Route	Proposed Orange Route	Balsam Variation
Historic Architectural Sites	Count within ROW	0	0	0
	Count within 0–1,500 ft	0	0	4
	Count within 0–5,280 ft	13	24	28
Archaeological Sites	Count within ROW	0	0	0
	Count within 0–1,500 ft	0	0	1

Source(s): SHPO 2014, reference (147); SHPO 2014, reference (155); SHPO 2014, reference (156)

Note(s): Totals may not sum due to rounding

(1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0-500 ft includes 500 ft on each side of the anticipated alignment.

within the indirect APEs for the Proposed Blue Route, Orange Route, and Balsam Variation are likely to occur wherever the proposed Project is visibly prominent in the landscape or a viewshed and appears inconsistent with the existing setting of the architectural resources or within views to and from the architectural resources. Since the indirect APEs for the Proposed Blue Route, Proposed Orange Route, and Balsam Variation contain historic architectural **resources** that have either not been evaluated for **NRHP-eligibility** or **have been previously** recommended potentially NRHP eligible, **have been previously** recommended NRHP eligible, or **are** considered NRHP eligible, the proposed Project may result in changes to the setting of these resources that could be considered an adverse impact under Section 106 of the NHPA if these historic architectural **resources** are determined NRHP-eligible and if setting is determined to be a character defining feature that contributes to the significance of the resource.

The Proposed Blue Route, Proposed Orange Route, and Balsam Variation have not been surveyed for cultural resources. As such, archaeological surveys, architectural surveys or inventories, and surveys or inventories for Native American resources will be required as part of cultural resources investigations conducted in compliance with federal and/or state regulations for archaeological resources and historic architectural sites. These cultural resources investigations will be implemented as part of the DOE's **Draft PA (Appendix V)** that will establish a process to identify cultural resources within the APE for the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, or mitigate potential adverse impacts on historic architectural sites as a result of implementation of the proposed Project.

Potential **short-term and long-term** adverse impacts from construction, operation, maintenance, and emergency repair related to historic and cultural properties are summarized in Section 5.3.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate adverse impacts to these resources, including TCPs, from the proposed Project.

6.4.3.4 Natural Environment

This section describes the water, vegetation, and wildlife resources within the Balsam Variation Area and the potential impacts from the proposed Project.

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the Balsam Variation Area are summarized in Table 6-188 and shown on Map 6-63. Additional, water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

The number of water crossings, need to place transmission structures in floodplains and wetlands, and quantity of wetland type conversion are the primary water resources impacts that would differ across the Proposed Blue Route, the Proposed Orange Route, and the Balsam Variation. The Proposed Blue Route, the Proposed Orange Route, and the Balsam Variation would not require crossing trout streams or impaired waters.

As shown in Figure 6-120, the Proposed Blue Route would cross the most PWIs, including Sucker Brook, three tributaries to Sucker Brook, two unnamed

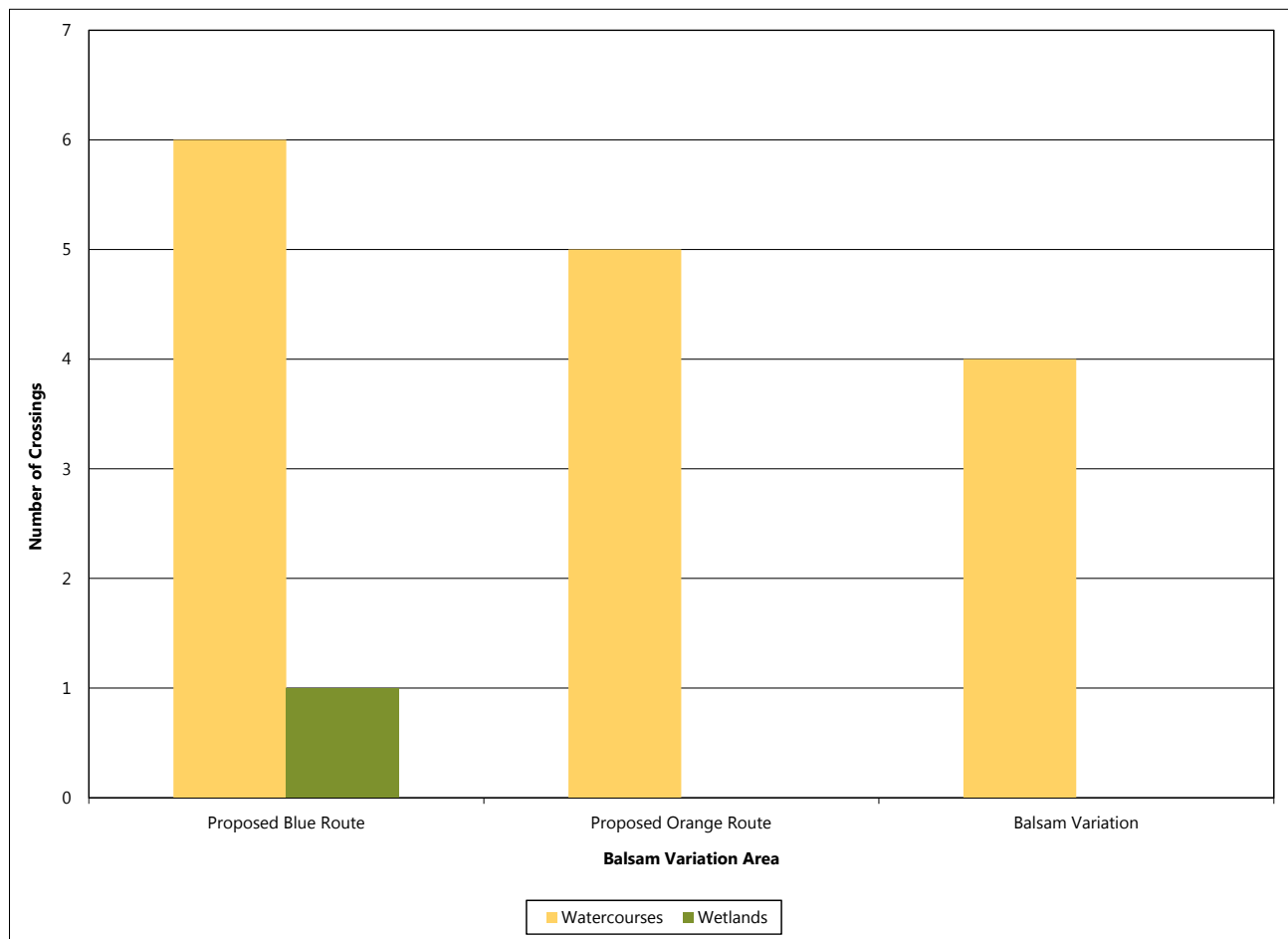
Table 6-188 Water Resources within the Anticipated ROW in the Balsam Variation Area

Resource	Evaluation Parameter	Balsam Variation Area		
		Proposed Blue Route	Proposed Orange Route	Balsam Variation
Transmission Line	Length (mi)	12.9	13.7	17.8
PWI Waters ⁽¹⁾	Number of Crossings	7	5	4
Non-PWI Waters ⁽²⁾	Number of Crossings	1	4	3
Floodplains ⁽³⁾	Acres within ROW	0	26	22
NWI Wetlands	Acres within ROW	54	69	96

Sources: USFWS 1997, reference (157); USGS 2014, reference (158); USGS 2014, reference (159); Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162); Minnesota Power 2014, reference (163)

Note(s): Totals may not sum due to rounding

- (1) PWI waters include watercourses, waterbodies, and wetlands, as described in Chapter 5. The number of each type of PWI water the Proposed Route and variations would cross are described in the text and figure below.
- (2) Non-PWI waters were calculated by removing the PWI-listed waters from the NHD dataset.
- (3) Floodplain acreage includes combined total 100-year and 500-year floodplain acreage. The acreage of floodplain by type that the Proposed Route and variations would cross is described in the text and figure below.

Figure 6-120 PWI Water Crossings by Type in the Balsam Variation Area

Source(s): USGS 2014, reference (158); USGS 2014, reference (159); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162)

Note(s): Totals may not sum due to rounding

watercourses, and wetlands of Grass Lake. The Proposed Orange Route's PWI crossings would include two crossings of the Prairie River, Balsam Creek, Sucker Brook, and one tributary to Sucker Brook. The Balsam Variation would also cross the Prairie River twice, as well as Balsam Creek and one tributary to Sucker Brook.

The Proposed Blue Route and the Proposed Orange Route and the Balsam Variation would all require crossing non-PWI waters. As shown in Figure 6-121, the Proposed Orange Route would require the most non-PWI water crossings.

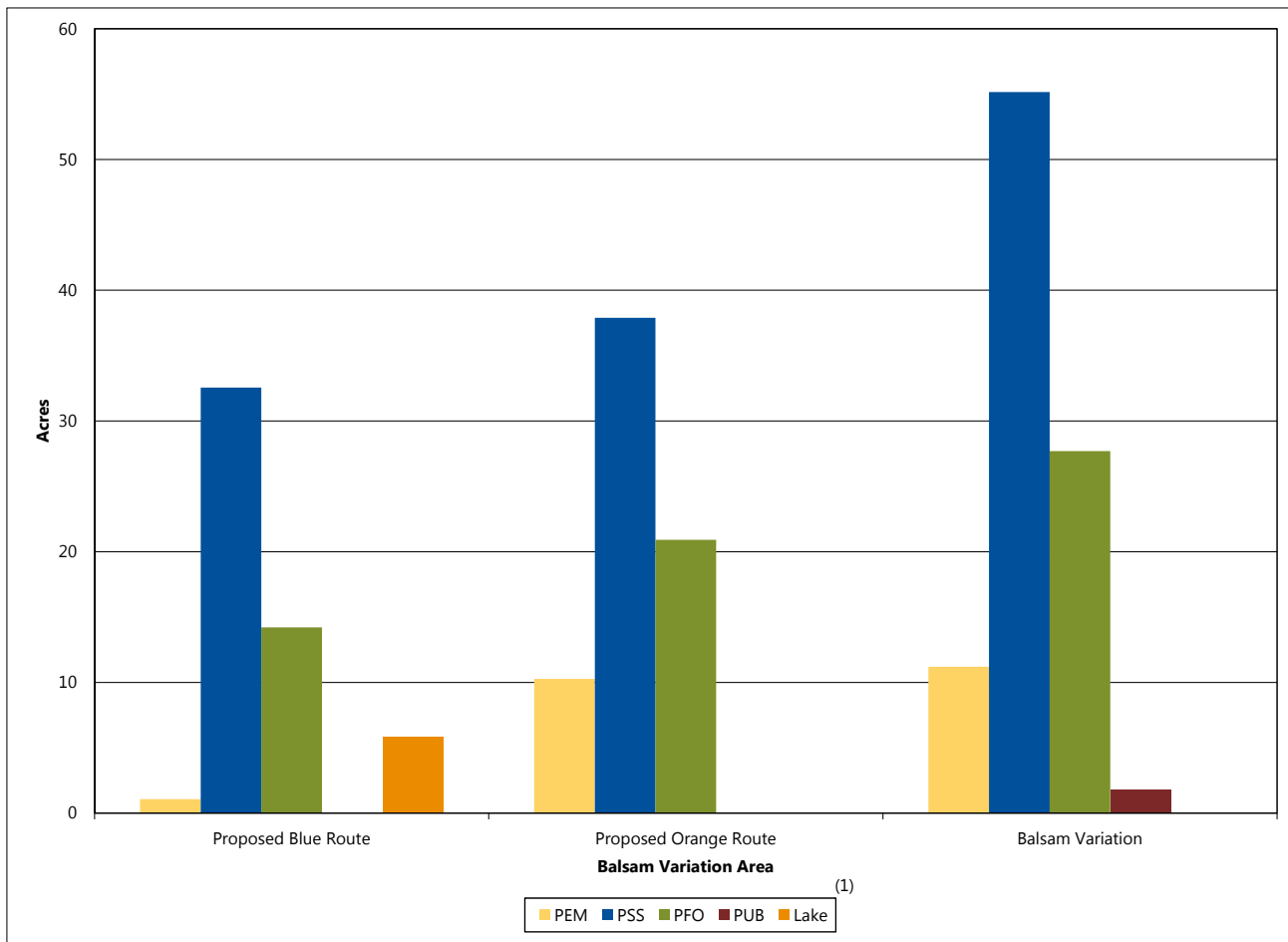
It is anticipated that PWI crossings and non-PWI water crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and transmission structures would not be placed within them.

Though the Proposed Blue Route would not traverse floodplains, both the Proposed Orange Route and the Balsam Variation would require construction and placement of transmission structures in Zone

A floodplain of the Prairie River. Placement of transmission structures in this floodplain could not be avoided by spanning as floodplain crossing distances exceed the average spanning length of 1,250 feet.

Based on the NWI, the Proposed Blue Route, the Proposed Orange Route, and the Balsam Variation would all require conversion of forested and shrub wetland areas to an herbaceous wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-122, the Balsam Variation contains the most forested and shrub wetland and would result in the greatest amount of wetland type conversion. While these direct, adverse impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to be minimal because of the amount of surrounding shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1.

Figure 6-122 Acres of Wetland by Type within the Anticipated ROW in the Balsam Variation Area



Source(s): USFWS 1997, reference (157)

Note(s): Totals may not sum due to rounding

(1) Palustrine emergent wetland (PEM), palustrine shrub wetland (PSS), palustrine forested wetland (PFO), palustrine unconsolidated bottom pond (PUB).

The Applicant would need to mitigate for these impacts as summarized in Section 5.3.4.1. The Proposed Blue Route, Proposed Orange Route, and the Balsam Variation would all require placement of fill in wetlands for construction of transmission structures. This impact cannot be avoided by spanning as wetland crossings in the East Section generally exceed the average spanning length allowable for structures, but impacts to wetlands from permanent fill would be expected to be minimal because of the localized extent of the impact (33 square feet per structure). Due to the number of wetland complexes in the area, it would be expected that the Proposed Blue Route, the Proposed Orange Route, and the Balsam Variation would all require temporary construction access through wetlands, which would be expected to be minimal due to the short-term, localized nature of the impact, and the Applicant's intended use of minimization measures, such as matting.

Potential construction, operation, maintenance, and emergency repair related short-term and long-term impacts on water resources are summarized in Section 5.3.4.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Vegetation

In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the Balsam Variation Area are summarized in Table 6-189 and shown on Maps 5-19 and 6-63. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

The primary impact on vegetation that would differ across the Proposed Blue Route, the Proposed Orange Route, and Balsam Variation is the loss or fragmentation of forest. As discussed in Section 5.3.4.2, the Applicant would permanently

Table 6-189 Vegetation Resources within the Anticipated ROW in the Balsam Variation Area

Resource	Evaluation Parameter	Balsam Variation Area		
		Proposed Blue Route	Proposed Orange Route	Balsam Variation
Transmission Line	Length (mi)	12.9	13.7	17.8
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	15	14	0
Abandoned Transmission Line	Percent of Total Length ⁽²⁾	0	22	66
Total Forested GAP Land Cover	Acres within ROW	299	318	401
GAP Land Cover - Dominant Types ⁽³⁾				
North American Boreal Forest	Acres within ROW	205	208	234
North American Boreal Flooded and Swamp Forest	Acres within ROW	12	15	40
Eastern North American Cool Temperate Forest	Acres within ROW	53	47	60
Eastern North American Flooded and Swamp Forest	Acres within ROW	29	47	68

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USGS 2001, reference (151)

Note(s): Totals may not sum due to rounding

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) Data presented here only includes dominant GAP types; see Appendix E for additional land cover types within the ROW.

clear woody vegetation from the ROW during construction and the ROW would be maintained as low-stature vegetation in order to reduce interference with the maintenance and function of the transmission line.

As indicated in Table 6-189 and Figure 6-123, the Balsam Variation would pass through more forested land, relative to the Proposed Blue Route and the Proposed Orange Route, therefore resulting in more permanent removal of forested vegetation. The Proposed Blue Route and the Proposed Orange Route are shorter in length and would require creation of new corridor for most of their length. The Balsam Variation would **be located in an abandoned transmission line corridor** (Table 6-189; Map 6-65). Because the Balsam Variation would follow the location of an abandoned transmission line for much of its length it would likely result in less impact on intact forested areas. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-19).

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on vegetation resources are summarized in Section 5.3.4.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

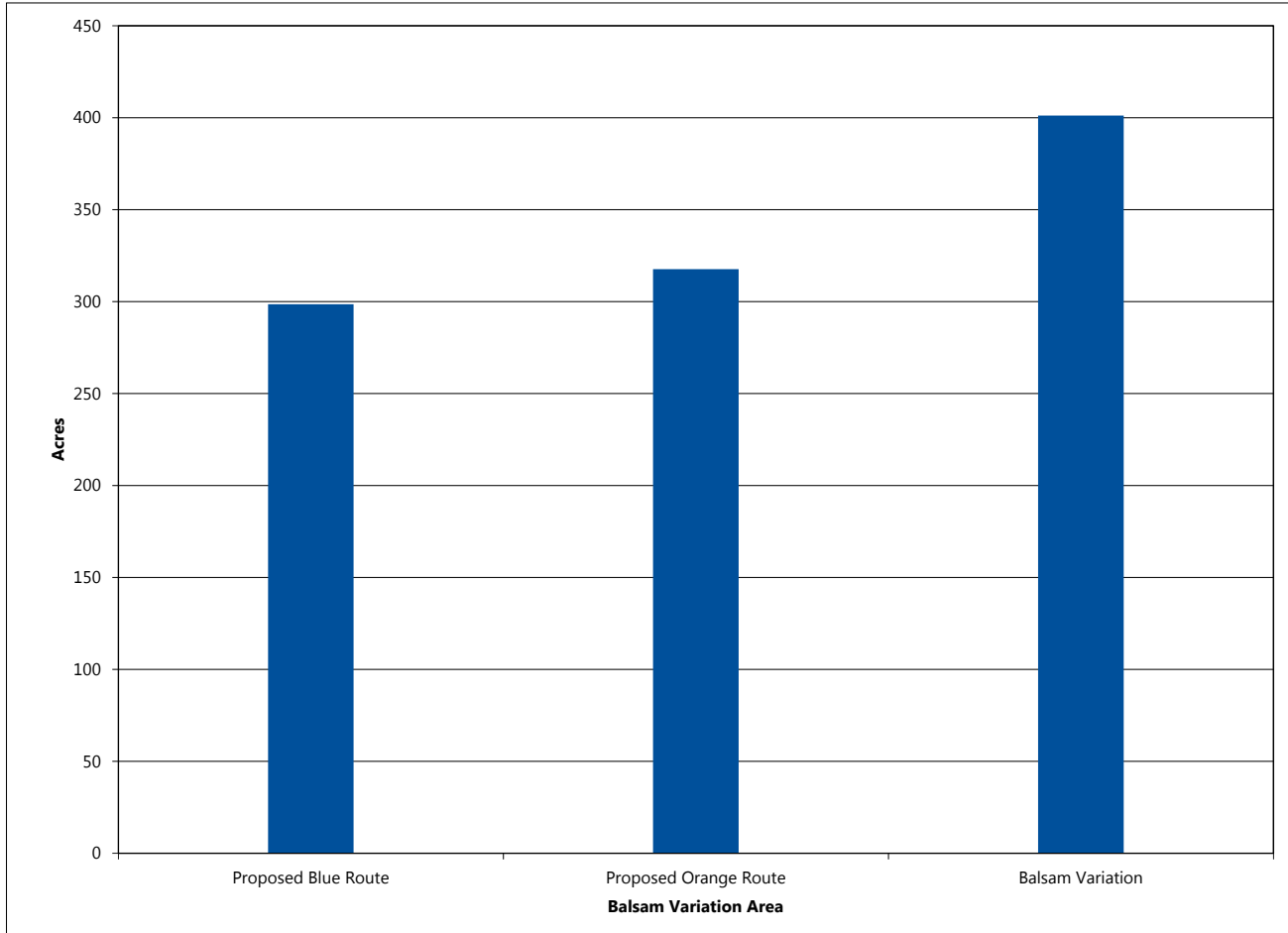
Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Data related to wildlife resources in the Balsam Variation Area are summarized in Table 6-190 and shown on Map 6-63.

The primary impacts on wildlife resources that would differ between the Proposed Blue Route, the Proposed Orange Route, and the Balsam Variation include loss and fragmentation of wildlife habitat and proximity of the Proposed Blue Route, the Proposed Orange Route, and the Balsam Variation to these areas. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor or create new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.4.3.4 (Vegetation) summarizes potential impacts on forested vegetation from the proposed routes and Balsam Variation.

As indicated in Table 6-190, the Proposed Blue Route and the Proposed Orange Route are shorter in length and would require creation of new corridor for most of their length. The Balsam Variation **would be located in an abandoned transmission line corridor** for over half of its length (Table 6-190; Map 6-65). Because the Balsam Variation would **be located in an abandoned**

Figure 6-123 Acres of all Forested GAP Land Cover Types within the Anticipated ROW in the Balsam Variation Area



Source(s): USGS 2001, reference (151)

Note(s): Totals may not sum due to rounding

Table 6-190 Information Relevant to Wildlife Resources in the Vicinity of the Balsam Variation Area

Resource	Evaluation Parameter	Balsam Variation Area		
		Proposed Blue Route	Proposed Orange Route	Balsam Variation
Transmission Line	Length (mi)	12.9	13.7	17.8
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	15	14	0
Abandoned Transmission Line	Percent of Total Length ⁽²⁾	0	22	66

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145)

Note(s): Totals may not sum due to rounding

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

transmission line corridor for much of its length it would likely result in less fragmentation of forested habitats, and subsequent displacement of wildlife species associated with those forest communities. However, clearing the location of the abandoned transmission line for the Balsam Variation may impact some wildlife inhabiting the area, resulting in temporary and/or permanent displacement of some wildlife.

The Balsam Variation would run within approximately 500 feet of the Chippewa Plains Important Bird Area and would require a new transmission line corridor at this point and throughout its entire length (Map 5-22 and Map 6-65). The Balsam Variation may result in more impacts on birds and other wildlife associated with the Chippewa Plains Important Bird Area because it would require creation of more corridor in this area.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on wildlife resources are summarized in Section 5.3.4.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project. Section 6.2.1.4 (Wildlife) discusses additional suggested measures to avoid, minimize, or mitigate impacts on wildlife are summarized.

6.4.3.5 Rare and Unique Natural Resources

Rare and unique natural resources are divided into rare species and rare communities. Rare species encompass federally listed or state endangered, threatened, or special concern species while rare communities may include state-designated features, such as SNAs, MBS Sites of Biodiversity Significance, MnDNR High Conservation Value Forest, MnDNR Ecologically Important Lowland Conifer stands, and MBS native plant communities.

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations. Data related to rare species in the Balsam Variation Area are summarized in Table 6-191; additional data on rare species, such as the presence of MnDNR tracked species, is provided in Appendix F. As a condition of the license agreement with MnDNR for access to the NHIS database, data pertaining to the documented locations of rare species are not shown on a map.

Proximity of state endangered, threatened, or special concern species is similar between the proposed routes and Balsam Variation. As discussed in Section 5.3.5, potential long-term impacts on rare species from the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation from construction.

As indicated in Table 6-191, the three state-special concern species documented within one mile of the Proposed Blue Route, the Proposed Orange Route, and the Balsam Variation are aquatic species. It is anticipated that all watercourses and waterbodies would be spanned; because of this impacts to these state-special concern species is not expected. As discussed under Wildlife in Section 6.4.3.4, the Balsam Variation would run within approximately 500 feet of the Chippewa Plains Important Bird Area (Map 6-63); because of this, the Balsam Variation may result in more impacts on rare birds and other wildlife associated with the Chippewa Plains Important Bird Area.

The Proposed Blue Route and the Proposed Orange Route would require establishment of new corridor for most of their length, while the Balsam Variation would be located in an abandoned transmission

Table 6-191 Rare Species Documented within One Mile of the Anticipated ROW in the Balsam Variation Area

Scientific Name ⁽¹⁾	Common Name	Federal Status	State Status	Type	Balsam Variation Area		
					Proposed Blue Route	Proposed Orange Route	Balsam Variation
<i>Lasmigona compressa</i>	Creek Heelsplitter	None	Special Concern	Mussel		X	X
<i>Ligumia recta</i>	Black Sandshell	None	Special Concern	Mussel	X	X	X
<i>Najas gracillima</i>	Thread-like Naiad	None	Special Concern	Vascular Plant	X		

Source(s): MnDNR 2015, reference (132)

(1) Canada lynx and gray wolf records are not documented in the NHIS database.

line corridor for over half of its length. Because the Balsam Variation would be located in an abandoned transmission line corridor for much of its length, it would likely result in less fragmentation of forested habitats, and subsequent impacts on rare species that may be associated with those forest communities. However, clearing the location of the abandoned transmission line for the Balsam Variation may impact rare species that may inhabit the area. However, the full extent of potential impacts from the Proposed Blue Route, the Proposed Orange Route, and the Balsam Variation cannot be determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. The MN PUC Route Permit could also require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

Any indirect impacts to rare species from the proposed Project are expected to be minimal because of the amount of surrounding habitat. Through use of Applicant proposed avoidance and minimization measures, direct impacts to rare species are not expected. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential impacts on federally listed species (Appendix R).

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on rare species are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Rare Communities

The ROI for the analysis of impacts to rare communities was described within Section 5.3.5 and includes the ROW of the proposed transmission line. Data related to rare communities and resources in the Balsam Variation Area are summarized in Table 6-192 and shown on Map 6-64; additional, more detailed data on rare communities and resources is provided in Appendix E.

The primary impact on rare communities and resources that would differ across the Proposed Blue Route, the Proposed Orange Route, and the Balsam Variation is the loss or conversion of native vegetation. As discussed in Section 5.3.5, the Applicant would permanently remove vegetation at each structure footprint and within portions of the ROW that are currently dominated by forest or other woody vegetation.

As indicated on Map 6-64 and in Table 6-192, the Proposed Orange Route would pass through the most MBS Sites of Biodiversity Significance. The Balsam Variation **would be located in an abandoned transmission line corridor** for over half of its length, while the Proposed Blue Route and the Proposed Orange Route would require creation of new corridor for the majority of their lengths. Because of this, the Proposed Blue Route and the Proposed Orange Route would result in more impacts on native vegetation and fragmentation of intact forest in areas where forest vegetation is present.

The rare communities and resources listed in Table 6-192 and detailed above show that the proposed Project may result in direct, long-term, regional localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional

Table 6-192 Rare Communities and Resources within the Vicinity of the Balsam Variation Area

Resource	Evaluation Parameter	Balsam Variation Area		
		Proposed Blue Route	Proposed Orange Route	Balsam Variation
Transmission Line	Length (mi)	12.9	13.7	17.8
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	15	14	0
Abandoned Transmission Line	Percent of Total Length ⁽²⁾	0	22	66
MBS Sites of Biodiversity Significance ⁽³⁾	Acres within ROW	78	105	95

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MBS 2015, reference (167)

Note(s): Totals may not sum due to rounding

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) MBS Sites of Biodiversity Significance data are preliminary in this portion of the proposed Project. Because of the preliminary status and/or unknown ranks, biodiversity significance ranks are not distinguished from one another here.

abundance and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities are expected to be significant if localized adverse impacts would result in a broader regional depletion of certain rare communities. The MN PUC Route Permit could require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on rare communities are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.4.3.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-65 shows areas where the Proposed Blue Route, Proposed Orange Route, and Balsam Variation would parallel corridors with existing transportation, transmission line, or other linear features in the Balsam Variation Area.

Table 6-193 and Figure 6-124 identifies the percentage of total transmission line length that the Proposed Blue Route, Proposed Orange Route, and Balsam Variation parallel an existing corridor or linear feature in the Balsam Variation Area.

The Balsam Variation would be located in an **abandoned transmission line corridor** for over half of its length (Table 6-193). The Proposed Blue Route and Proposed Orange Route each would parallel an existing corridor for one-quarter of their lengths; however the Proposed Orange Route would be **located in an abandoned transmission line corridor** for another one-quarter of its length.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on corridor sharing are summarized in Section 5.3.6. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on corridor sharing from the proposed Project.

6.4.3.7 Electrical System Reliability

As explained in Section 5.3.7, the ROI for Electrical System Reliability was determined to be the corridors for the existing transmission lines. Data related to electrical system reliability in the Balsam Variation Area are shown on Map 6-65.

The Balsam Variation would not parallel an existing transmission line in the Balsam Variation Area. The Proposed Blue Route and Proposed Orange Route would parallel two 115 kV transmission lines for approximately 15 percent of their length in the southern portion of the Balsam Variation Area (Table 6-193); therefore, three transmission lines would be in adjacent corridors.

The configuration may decrease the reliability of the proposed Project. When facilities are located in close proximity, there is a greater risk that a single event can take out multiple lines. Additionally, the close proximity of the lines can make repairing the

Table 6-193 Corridor Sharing in the Balsam Variation Area

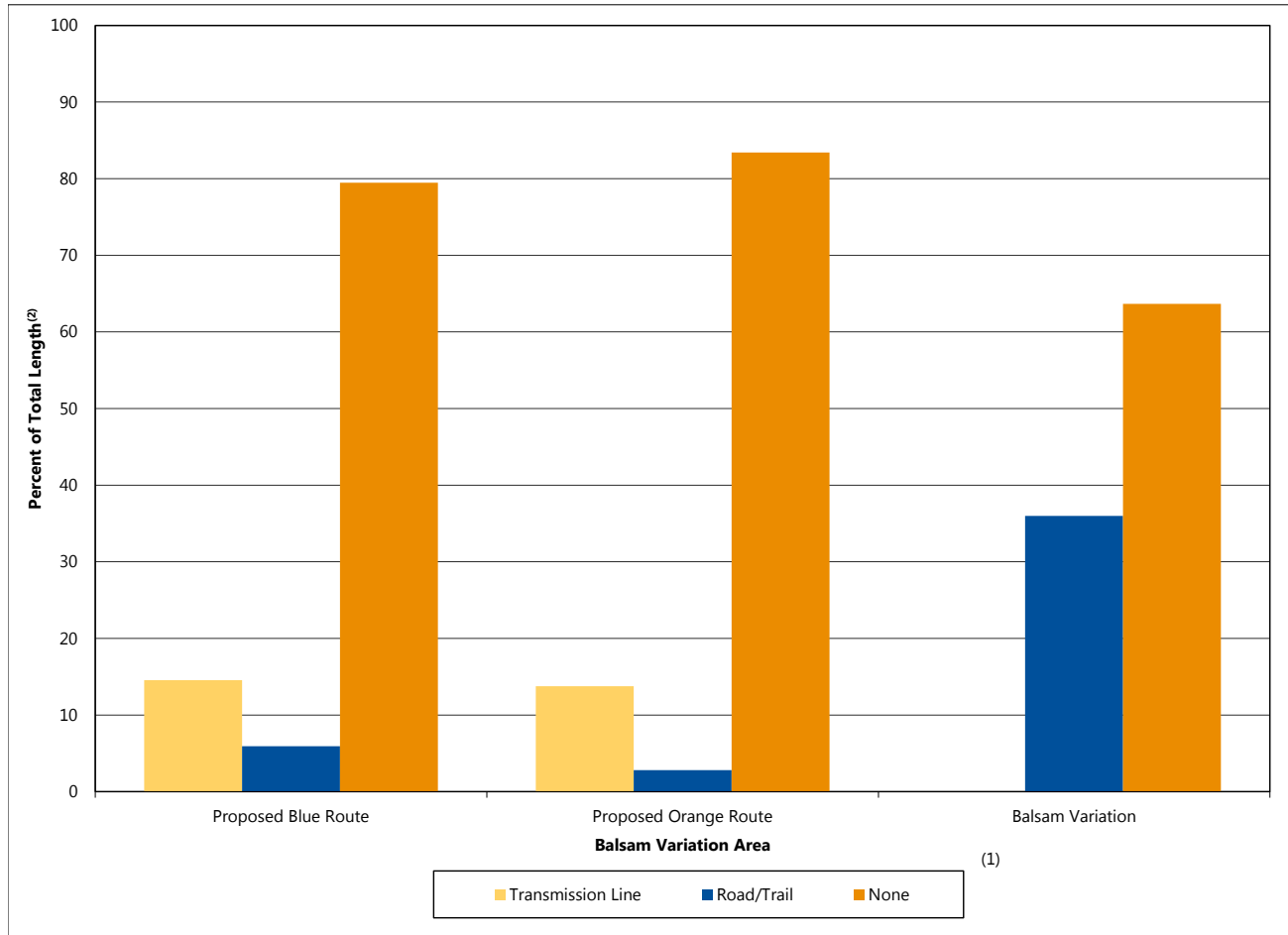
Feature Sharing Corridor ⁽¹⁾	Evaluation Parameter	Balsam Variation Area		
		Proposed Blue Route	Proposed Orange Route	Balsam Variation
Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field, line, PLSS)	Percent of Total Length ⁽²⁾	15	14	0
Road/Trail (other linear features, but not transmission lines, may be present within the road/trail corridor; i.e., PLSS, field line)	Percent of Total Length ⁽²⁾	6	3	36
None	Percent of Total Length ⁽²⁾	79	83	64

Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

Note(s): Totals may not sum due to rounding

- (1) More than one feature may share the corridor; the primary feature within the corridor is identified, other features that may share the corridor are listed in parenthesis. Appendix E provides a detailed summary of all shared features.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-124 Corridor Sharing in the Balsam Variation Area



Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

Note(s): Totals may not sum due to rounding

- (1) Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field line, PLSS); Road/Trail (other linear features, but not transmission lines, may be present within the road/trail corridor, i.e., PLSS, field line).
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

lines more difficult. These difficulties could increase outage times, should an outage occur. Adverse impacts are possible as a result of the construction of the construction and operation of three high-voltage transmission lines under one variation in the East Section.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on electrical system reliability are summarized in Section 5.3.7. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on electrical system reliability.

6.4.3.8 Costs of Constructing, Operating, and Maintaining the Facility which are Dependent on Design and Route

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-194 summarizes the costs associated with constructing the Proposed Blue Route, Proposed Orange Route, and Balsam Variation in the Balsam Variation Area. As indicated in Table 6-194, the Balsam Variation would cost the most to construct, while the Proposed Blue Route would cost the least to construct.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using

Table 6-194 Construction Costs in the Balsam Variation Area

Variation Area	Name in the EIS	Cost (Total)	Average Cost (per mile)	Length (mi)
Balsam	Proposed Blue Route	\$15,121,621	\$1,172,219	12.9
	Proposed Orange Route	\$16,018,490	\$1,169,233	13.7
	Balsam Variation	\$19,502,472	\$1,095,644	17.8

Source(s): Minnesota Power 2015, reference (9)

the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$20,000 to \$29,000 annually for these alternatives in the Balsam Variation Area.

6.4.4 Dead Man's Pond Variation Area

The Dead Man's Pond Variation Area encompasses two route alternatives: the Proposed Blue Route and the Dead Man's Pond Variation. This section provides a comparison of the potential impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project within the Dead Man's Pond Variation Area, depending on the route or variation considered.

6.4.4.1 Human Settlement

This section describes the aesthetic resources and zoning and land use compatibility within the Dead Man's Pond Variation Area and the potential impacts from the proposed Project.

Aesthetics

As described in the Aesthetics discussion for the Effie Variation Area (see Section 6.4.1.1), impacts on aesthetic resources would be determined based largely on the level of increased contrast produced by the proposed Project in views by sensitive viewers. Residences and other aesthetic resources within 1,500 feet of the anticipated alignment would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI. Data related to aesthetic resources in the Dead Man's Pond Variation Area are summarized in Table 6-195 and shown on Maps 6-61, 6-62, 6-63, and 6-65.

As indicated in Table 6-195 for the Dead Man's Pond Variation Area, the Proposed Blue Route and Dead Man's Pond Variation would both be located within one mile of a historic architectural site, an aesthetic resource with high visual sensitivity. In addition, both routes would be located within 1,500 feet of residences, which also have high visual sensitivity (Figure 6-125). The Proposed Blue Route would be located within 1,500 feet of two residences, one of which is within 1,000 feet of the transmission

line, and the Dead Man's Pond Variation would be located within 1,500 feet of four residences, one of which is within 1,000 feet of the transmission line. Therefore, Dead Man's Pond Variation could affect more residences with high visual sensitivity.

Both the Proposed Blue Route and Dead Man's Pond Variation are approximately the same length, with the Dead Man's Pond Variation slightly longer (2.3 miles) than the Proposed Blue Route (2.2 miles; Table 6-195). Neither the Proposed Blue Route nor Dead Man's Variation parallel an existing large transmission line. Therefore, contrast for both routes would be similar, with the Dead Man's Pond Variation producing slightly more contrast due to its slightly greater length.

Because the Proposed Blue Route would produce slightly less contrast and affect fewer residences (two) than the Dead Man's Pond Variation (four), the Proposed Blue Route would result in less aesthetic impact than the Dead Man's Pond Variation in the Dead Man's Pond Variation Area.

Although the Proposed Blue Route and Dead Man's Pond Variation do not parallel an existing large transmission line of similar size and design, they are short in length and affect few residences (two and four, respectively) and very few other sensitive visual resources (one historic architectural site).

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on aesthetics are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Land Use Compatibility

As explained in Section 5.3.1.1, the ROI for Land Use Compatibility was determined to be 1,500 feet from the anticipated alignments of the proposed Project.

Land Uses

Table 6-196 identifies the amount of each type of land cover within 1,500 feet of the anticipated

Table 6-195 Aesthetic Resources within the ROI in the Dead Man's Pond Variation Area

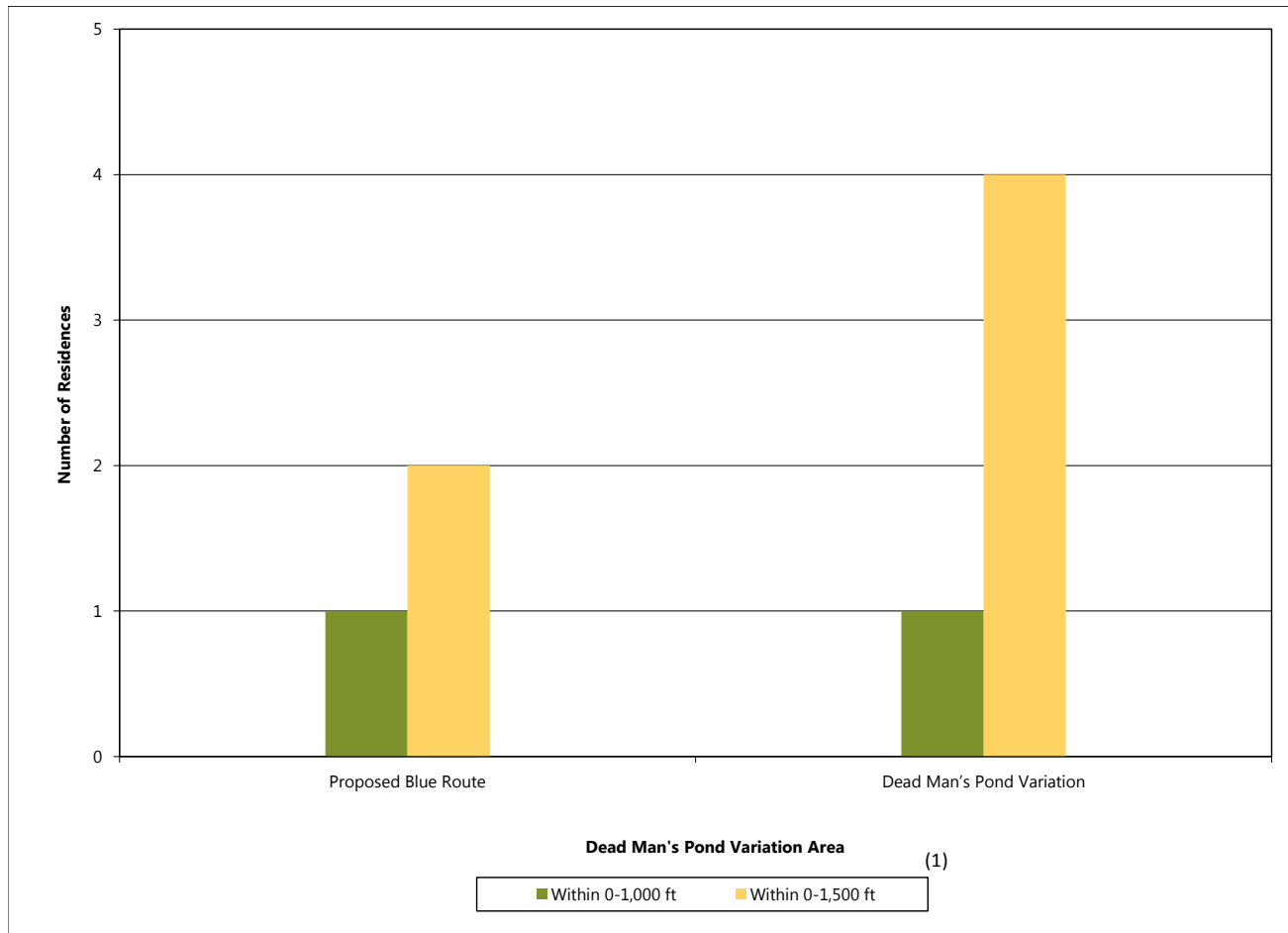
Resource	Evaluation Parameter ⁽¹⁾	Dead Man's Pond Variation Area	
		Proposed Blue Route	Dead Man's Pond Variation
Transmission Line	Length (mi)	2.2	2.3
Existing Transmission Line ⁽²⁾	Percent of Total Length ⁽³⁾	0	0
Residences	Count within 0-500 ft	0	0
	Count within 0-1,000 ft	1	1
	Count within 0-1,500 ft	2	4
Historic Architectural Sites	Count within 0-1,500 ft	0	0
	Count within 0-5,280 ft	1	1

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Minnesota Power 2014, reference (146); SHPO 2014, reference (147)

Note(s): Totals may not sum due to rounding

- (1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.
- (2) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-125 Residences within the ROI in the Dead Man's Pond Variation Area



Source(s): Minnesota Power 2014, reference (146)

Note(s): Totals may not sum due to rounding

- (1) Area/Count within a distance includes both sides of the anticipated alignment. For example, count within 0-500 ft includes 500 ft on each side of the anticipated alignment.

alignments of the Proposed Blue Route and Dead Man's Pond Variation in the Dead Man's Pond Variation Area. Generally, the percentage of each land use is representative of what is present within the ROW. The various land uses present in the Dead Man's Pond Variation Area are shown in Map 5-19 and residences, churches, cemeteries, and airports near the Proposed Blue Route and Dead Man's Pond Variation are shown on Map 6-61.

The Proposed Blue Route and Dead Man's Pond Variation ROI are both primarily composed of forested and/or swamp land (Table 6-196). The Dead Man's Pond Variation ROI contains a greater amount of forested/swamp land than the Proposed Blue Route, and both would contain a similar amount of developed or disturbed land.

Land Ownership and Management

Table 6-197 and Figure 6-126 identify that the Dead Man's Pond Variation contains a greater amount of state fee land than the Proposed Blue Route. None of the land within either ROW is state forest land. No impacts to county lands, state conservation easements or USFWS interest lands would occur under the Proposed Blue Route or Dead Man's Pond Variation.

Neither the Proposed Blue Route nor the Dead Man's Pond Variation would parallel an existing corridor; however, the Proposed Blue Route would follow a road/trail for a portion of its length (see Section 6.4.4.6). Therefore, the Proposed Blue Route would be expected to have slightly less incompatibility with surrounding land uses compared to the Dead Man's Pond Variation.

Impacts to land use from the proposed Project in the Dead Man's Pond Variation Area would

be similar to those described in Section 6.2.1.1. The Proposed Blue Route and Dead Man's Pond Variation would both result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use. The length of the route that would parallel an existing corridor is also important. The Proposed Blue Route avoids a greater amount of state forest and state fee lands than the Dead Man's Pond Variation therefore avoiding long-term changes to land use; further, the Proposed Blue Route parallels an existing road/trail for a portion of its length whereas the Dead Man's Pond Variation does not parallel an existing corridor.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on land use are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.4.4.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the Dead Man's Pond Lake Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the Dead Man's Pond Variation Area are summarized in Table 6-198.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the transmission line. Table 6-198 and Figure 6-127 show the acreage of USDA-NRCS-classified prime

Table 6-196 Land Uses within the ROI in the Dead Man's Pond Variation Area

Resource	Type ⁽¹⁾	Evaluation Parameter ⁽²⁾	Dead Man's Pond Variation Area	
			Proposed Blue Route	Dead Man's Pond Variation
GAP Land Cover Vegetation Class Level - Division 4	Total	Acres within 0–1,500 ft	961	987
	Developed or Disturbed	Acres within 0–1,500 ft	35	33
	Agricultural	Acres within 0–1,500 ft	0	2
	Forested and/or Swamp	Acres within 0–1,500 ft	905	925
	Other	Acres within 0–1,500 ft	21	27

Source(s): USGS 2001, reference (151)

Note(s): Totals may not sum due to rounding

- (1) Other category includes: Open water, Great Plains Grassland and Shrubland and Introduced and Semi-Natural Vegetation. See detailed summary of all types in Appendix E.
- (2) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

Table 6-197 Land Ownership/Management within the Anticipated ROW in the Dead Man's Pond Variation Area

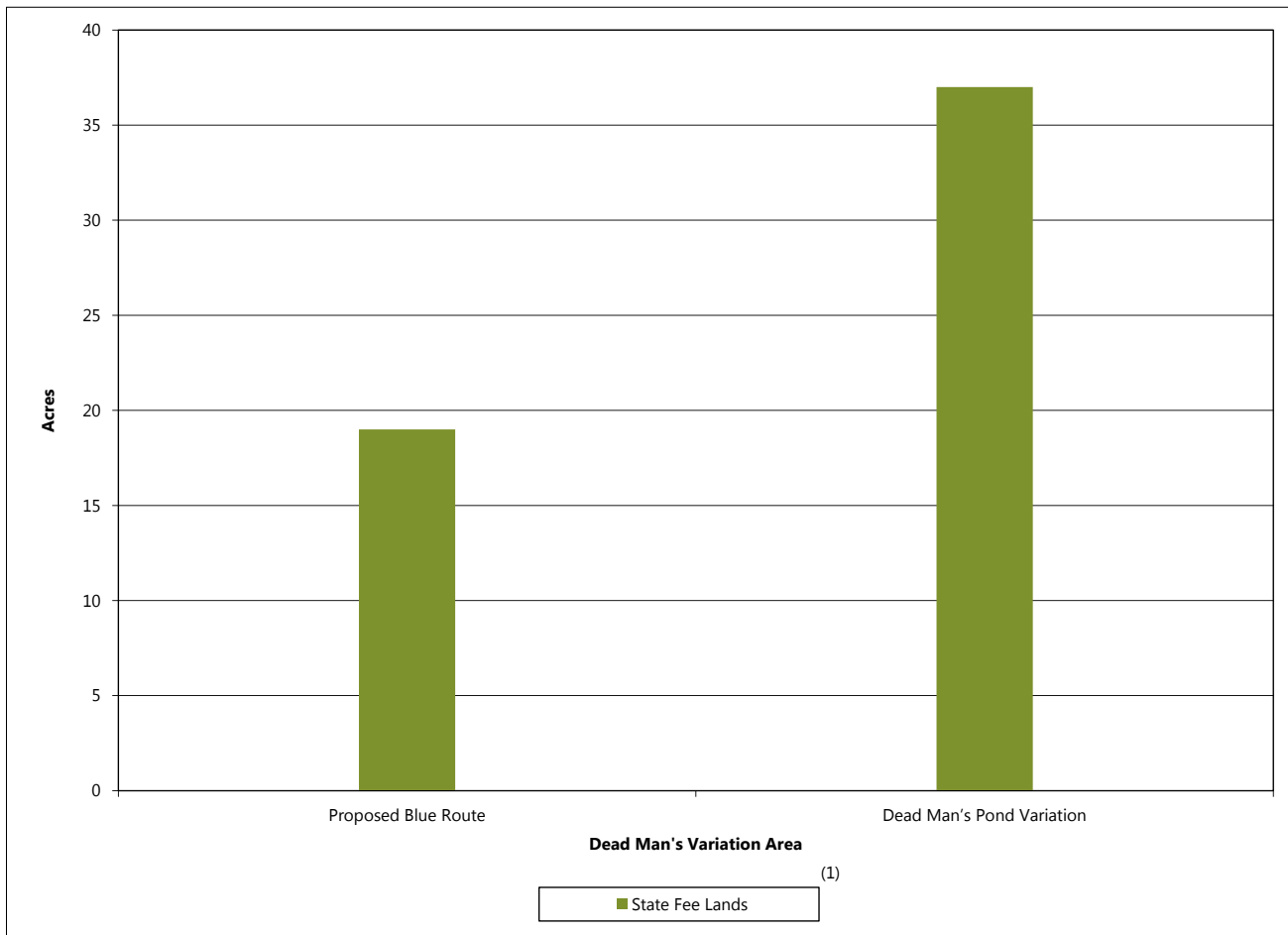
Resource	Type	Evaluation Parameter	Dead Man's Pond Variation Area	
			Proposed Blue Route	Dead Man's Pond Variation
Total Lands	--	Acres within ROW	54	56
State Fee Lands ⁽¹⁾ Total	--	Acres within ROW	19	37
State Fee Lands ⁽¹⁾ by Type	Consolidated Conservation	Acres within ROW	0	0
	Other - Acquired, Tax Forfeit, Volstead	Acres within ROW	19	37
	Trust Fund	Acres within ROW	0	0
	Federal - State Lease	Acres within ROW	0	0
Private Lands ⁽²⁾	--	Acres within ROW	35	19

Source(s): MnDNR 2014, reference (152)

Note(s): Totals may not sum due to rounding

- (1) This dataset represents state land ownership using public land survey quarter-quarter sections as the smallest unit. In some cases, multiple state lands are located within a single quarter-quarter section. Therefore, features may be duplicated and the analysis results may over-represent potential impacts.
- (2) Acreage for private lands was calculated as the difference between total lands and public lands.

Figure 6-126 Public Land Ownership/Management within the ROI in the Dead Man's Pond Variation Area



Source(s): MnDNR 2014, reference (152)

Note(s): Totals may not sum due to rounding

- (1) This dataset represents state land ownership using public land survey quarter-quarter sections as the smallest unit. In some cases, multiple state lands are located within a single quarter-quarter section. Therefore, features may be duplicated and the analysis results may over-represent potential impacts.

Table 6-198 Land-Based Economy Resources within the Anticipated ROW in the Dead Man's Pond Variation Area

Resource	Type	Evaluation Parameter	Dead Man's Pond Variation Area	
			Proposed Blue Route	Dead Man's Pond Variation
Transmission Line	--	Length (mi)	2.2	2.3
Existing Transmission Line ⁽¹⁾	--	Percent of Total Length ⁽²⁾	0	0
Farmland	Not Farmland	Acres within ROW	34	17
	Prime Farmland if Drained	Acres within ROW	9	1
	Farmland of Statewide Importance	Acres within ROW	0	0
	All Areas are Prime Farmland	Acres within ROW	11	38

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154)

Note(s): Totals may not sum due to rounding

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the Proposed Blue Route and Dead Man's Pond Variation in the ROI.

The Dead Man's Pond Variation would pass through more farmland, including prime farmland (Figure 6-127). The Proposed Blue Route and Dead Man's Pond Variation would not impact farmland of statewide importance.

As discussed in Section 5.3.2.1, construction activities could limit the use of fields or could affect crops and soil by compacting soil, generating dust, damaging crops or drain tile, or causing erosion. Construction activities would also cause long-term adverse impacts to agriculture by the potential loss of income due to the removal of farmland for transmission line structures and associated facilities. Maintenance and emergency repair activities could result in adverse direct impacts on farmlands from the removal of crops, localized physical disturbance, and soil compaction caused by equipment.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on agricultural resources are summarized in Section 5.3.2.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line. There are no state forests lands or USDA-USFS national forest lands within the ROI of the Proposed Blue Route or Dead Man's Pond Variation in the Dead Man's Pond Variation Area.

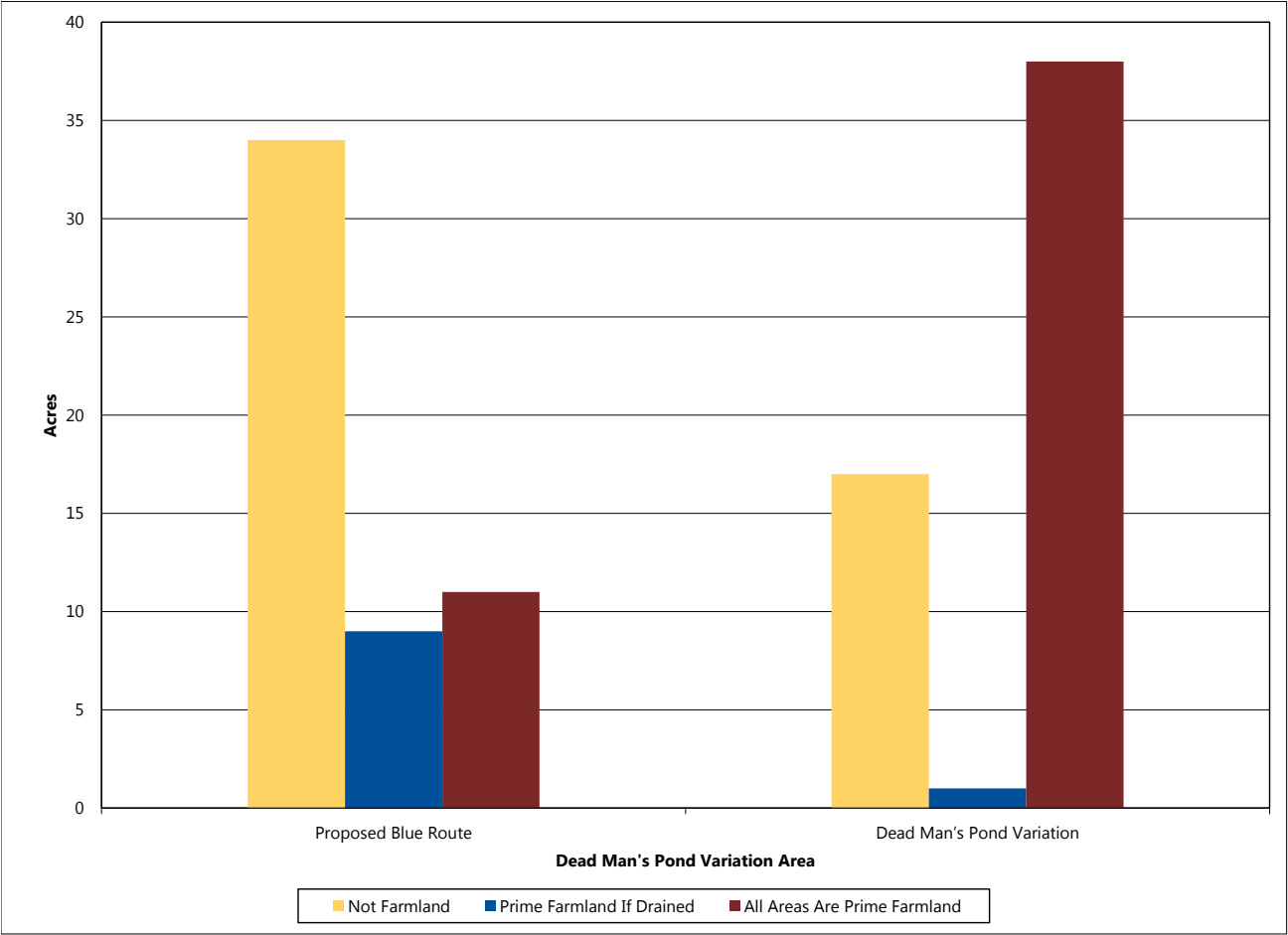
Mining and Mineral Resources

As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the transmission line. There are no active or expired/terminated state mineral leases, records of current mineral mining, or known aggregate resources that would be impacted by the Proposed Blue Route or Dead Man's Pond Variation within the Dead Man's Pond Variation Area.

As discussed in Section 5.3.2.3, construction of transmission lines could affect future mining operations if the structures interfere with access to mineable resources or the ability to remove these resources. However, such impacts are not expected from the proposed Project because such activities do not exist nor are planned in this area.

Potential construction, operation, maintenance, and emergency-repair short-term and long-term impacts on mining and mineral resources are summarized in Section 5.3.2.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Figure 6-127 Acres of Farmland by Type within the Anticipated ROW in the Dead Man's Pond Variation Area



Source(s): USDA NRCS 2014, reference (154)

Note(s): Totals may not sum due to rounding

6.4.4.3 Archaeology and Historic Architectural Sites

As described in Section 6.2.1.3, the APE for potential direct impacts to archaeological and historic architectural resources includes the ROW of the proposed transmission line, however, potential indirect impacts to historic architectural sites are evaluated within one mile from the anticipated alignment since visual intrusions can change the context and setting of historic architectural sites. Table 6-199 provides a summary of the previously recorded **archaeological sites and historic architectural resources within the ROW** (direct APE) and within 1,500 feet and one mile of the anticipated alignments (indirect APE) for the Proposed Blue Route and Dead Man's Pond Variation in the Dead Man's Pond Variation Area (Map 6-62). A more detailed description of these resources can be found in the Phase IA cultural resources survey report located in Appendix P.

To date, no specific Native American resources have been previously recorded within the ROW

(direct APE for cultural resources) or within one mile of the anticipated alignment (indirect APE for historic architectural resources or Native American resources) for the Proposed Blue Route and Dead Man's Pond Variation in the Dead Man's Pond Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources within the direct and indirect APEs for the proposed Project.

Within the Dead Man's Pond Variation Area, there are no archaeological sites or historic architectural resources located within the ROW of the Proposed Blue Route or Dead Man's Pond Variation. One historic architectural resource (IC-NWT-003) is located within the indirect APEs of both the Proposed Blue Route and Dead Man's Pond Variation. This site has not been evaluated for NRHP eligibility.

There is currently no known potential for direct, long-term adverse impacts to archaeological and historic resource sites within the Dead Man's Pond Variation Area as none have been identified. Indirect,

long-term, adverse visual impacts on the historic architectural resources within the indirect APEs for the Proposed Blue Route or Dead Man's Pond Variation are likely to occur wherever the proposed Project is visibly prominent in the landscape or a viewshed and appears inconsistent with the existing setting of the architectural resources or within views to and from the architectural resources. Since the indirect APEs for both the Proposed Blue Route and Dead Man's Pond Variation contain historic architectural sites that have not been evaluated for NRHP-eligibility, the proposed Project may result in changes to the setting of these resources that could be considered an adverse impact under Section 106 of the NHPA if these historic architectural sites are determined NRHP-eligible and if setting is determined to be a character defining feature that contributes to the significance of the resource.

As the Proposed Blue Route and Dead Man's Pond Variation have not been surveyed for cultural resources, archaeological surveys, architectural surveys or inventories, and surveys or inventories for Native American resources will be required as part of cultural resources investigations conducted in compliance with federal and/or state regulations for archaeological resources and historic architectural properties. These cultural resource investigations will be implemented as part of DOE's Draft PA (Appendix V) that will establish a process to identify cultural resources within the APE for

the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, or mitigate potential adverse impacts on historic properties as a result of implementation of the proposed Project.

Potential short-term and long-term adverse impacts from construction, operation, maintenance, and emergency-repair related activities to historic and cultural properties are summarized in Section 5.3.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate adverse impacts to these resources, including TCPs, from the proposed Project.

6.4.4.4 Natural Environment

This section describes the water, vegetation, and wildlife resources within the Dead Man's Pond Variation Area and the potential impacts from the proposed Project.

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the Dead Man's Pond Variation Area are summarized in Table 6-200 and shown on Map 6-63. Additional, water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

Table 6-199 Archaeological and Historic Resources within the Dead Man's Pond Variation Area

Resource	Evaluation Parameter ⁽¹⁾	Dead Man's Pond Variation Area	
		Proposed Blue Route	Dead Man's Pond Variation
Historic Architectural Sites	Count within ROW	0	0
	Count within 0–1,500 ft	0	0
	Count within 0–5,280 ft	1	1
Archaeological Sites	Count within ROW	0	0
	Count within 0–1,500 ft	0	0

Source(s): SHPO 2014, reference (147); SHPO 2014, reference (155); SHPO 2014, reference (156)

Note(s): Totals may not sum due to rounding

(1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

Table 6-200 Water Resources within the Anticipated ROW in the Dead Man's Pond Variation Area

Resource	Evaluation Parameter	Dead Man's Pond Variation Area	
		Proposed Blue Route	Dead Man's Pond Variation
Transmission Line	Length (mi)	2.2	2.3
NWI Wetlands	Acres within ROW	14	4

Sources: USFWS 1997, reference (157); Minnesota Power 2014, reference (144)

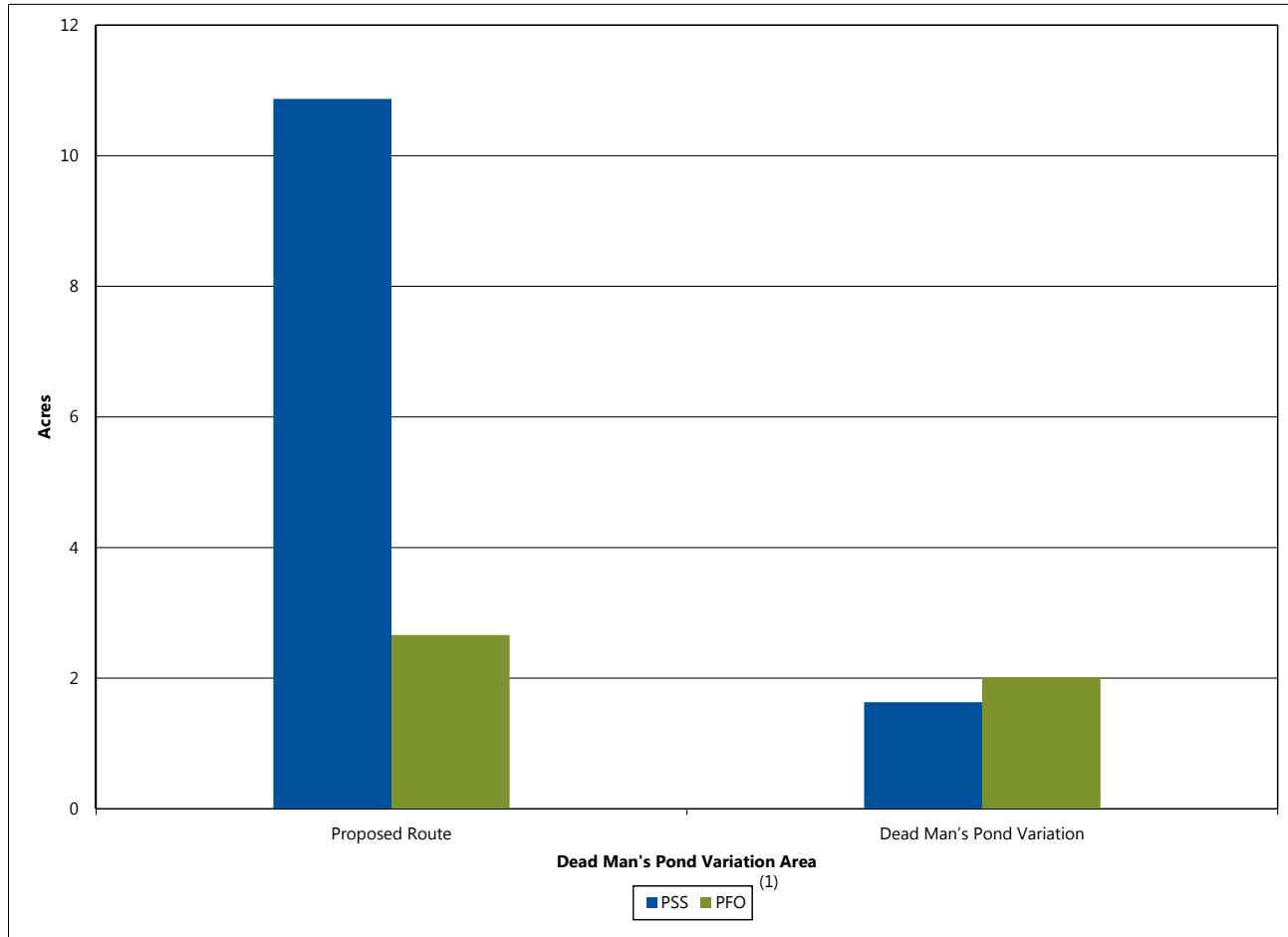
Note(s): Totals may not sum due to rounding

The potential need to place transmission structures in wetlands and the quantity of wetland type conversion are the primary water resources impacts that would differ between the Proposed Blue Route and the Dead Man's Pond Variation. Neither the Proposed Blue Route nor the Dead Man's Pond Variation ROWs contain PWIs, non-PWI waters, trout streams, impaired waters, or floodplains.

Based on the NWI, the Proposed Blue Route and the Dead Man's Pond Variation would both require conversion of forested and shrub wetland areas to an herbaceous wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-128, the Proposed Blue Route contains the most forested and shrub wetland and would result in the greatest amount of wetland type conversion. While these direct, adverse impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are expected to be minimal because of the amount of surrounding shrub

and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1. The Applicant would need to mitigate for these impacts, as summarized in Section 5.3.4.1. The Proposed Blue Route would likely require placement of fill in wetlands for construction of transmission structures. Impacts associated with fill would be minimized by spanning wetlands to the extent practical; however, this impact cannot be completely avoided by spanning due to the high number of wetland crossings that would be needed in the East Section. There are fewer wetlands along the Dead Man's Pond Variation and it would be expected that these areas may be spanned, avoiding placement of transmission structures in the wetland areas. Due to the number of wetland complexes in the area, it would be expected that the Proposed Blue Route and the Dead Man's Pond Variation would both require temporary construction access through wetlands, which is also likely be minimal due to the short-term, localized nature of the impact, and the Applicant's intended use of minimization measures, such as matting.

Figure 6-128 Acres of Wetland by Type within the Anticipated ROW in the Dead Man's Pond Variation Area



Source(s): USFWS 1997, reference (157)

Note(s): Totals may not sum due to rounding

(1) Palustrine emergent wetland (PEM), palustrine shrub wetland (PSS), palustrine forested wetland (PFO).

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on water resources are summarized in Section 5.3.4.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Vegetation

In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the Dead Man's Pond Variation Area are summarized in Table 6-201 and shown on Maps 5-19 and 6-63. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

In general, loss or fragmentation of forest would be similar with either the Proposed Blue Route or Dead Man's Pond Variation. As discussed in Section 5.3.4.2, the Applicant would permanently clear woody vegetation from the ROW during construction and the ROW would be maintained as low-stature vegetation in order to reduce interference with the maintenance and function of the transmission line.

As indicated in Table 6-201, the Proposed Blue Route and Dead Man's Pond Variation would pass through a similar amount of forested land. Both the Proposed Blue Route and Dead Man's Pond Variation would require new corridor for their entire lengths. Because of this both the Proposed Blue Route and Dead Man's Pond Variation would result in similar fragmentation of intact forest in areas

where forest vegetation is present. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-19).

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on vegetation resources are summarized in Section 5.3.4.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Wildlife resources in the Dead Man's Pond Variation Area consist of natural habitat, including forest, wetlands, and Dead Man's Pond (Map 6-63). As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor or create new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.4.4.4 (Vegetation) summarizes potential impacts on forested vegetation from the Proposed Blue Route and Dead Man's Pond Variation.

Because the Proposed Blue Route and Dead Man's Pond Variation are similar in length and do not parallel existing transmission line corridors, the impacts related to fragmentation of forested habitats, and subsequent displacement of wildlife species associated with those forest communities would be similar.

Table 6-201 Vegetation Resources within the Anticipated ROW in the Dead Man's Pond Variation Area

Resource	Evaluation Parameter	Dead Man's Pond Variation Area	
		Proposed Blue Route	Dead Man's Pond Variation
Transmission Line	Length (mi)	2.2	2.3
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	0	0
Total Forested GAP Land Cover	Acres within ROW	50	54
GAP Land Cover - Dominant Types ⁽³⁾			
North American Boreal Forest	Acres within ROW	34	43
Eastern North American Cool Temperate Forest	Acres within ROW	14	6

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USGS 2001, reference (151)

Note(s): Totals may not sum due to rounding

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) Data presented here only includes dominant GAP types; see Appendix E for additional land cover types within the ROW.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on wildlife resources are summarized in Section 5.3.4.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project. Section 6.2.1.4 (Wildlife) discusses additional suggested measures to avoid, minimize, or mitigate impacts on wildlife are summarized.

6.4.4.5 Rare and Unique Natural Resources

Rare and unique natural resources are divided into rare species and rare communities. Rare species encompass federally listed or state endangered, threatened, or special concern species while rare communities may include state-designated features, such as SNAs, MBS Sites of Biodiversity Significance, MnDNR High Conservation Value Forest, MnDNR Ecologically Important Lowland Conifer stands, and MBS native plant communities.

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations. As discussed in Section 5.3.5, potential long-term impacts on rare species from the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation. **One state-threatened fish, the pugnose shiner (*Notropis anogenus*) has been documented within one mile of the Dead Man's Pond Variation. Because it is anticipated that all waterbodies and watercourses would be spanned, impacts to this aquatic species are not expected.** However, the full extent of potential impacts from either the Proposed Blue Route or Dead Man's Pond Variation cannot be determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. The MN PUC Route Permit could require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

Any indirect impacts to rare species from the proposed Project are expected to be minimal because of the amount of surrounding habitat. Through use of Applicant proposed avoidance and minimization measures, direct impacts to rare species are not expected. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential

impacts on federally listed species (Appendix R). Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on rare species are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Rare Communities

As discussed in Section 5.3.5, the Applicant would permanently remove vegetation at each structure footprint and within portions of the ROW that are currently dominated by forest or other woody vegetation. While both the Proposed Blue Route and Dead Man's Pond Variation in the Dead Man's Pond Variation Area pass through native vegetation, at present, there are no documented rare communities within either ROW (ROI for rare communities). The MN PUC Route Permit could require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on rare communities are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.4.4.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-65 shows areas where the proposed route and variations would parallel corridors with existing transportation, transmission line, or other linear features in the Dead Man's Pond Variation Area.

Table 6-202 and Figure 6-129 identify the percentage of total transmission line length that the Proposed Blue Route and Dead Man's Pond Variation parallel an existing corridor or linear feature in the Dead Man's Pond Variation Area.

The Proposed Blue Route would parallel existing road/trail corridors for approximately one sixth of its length (Table 6-202). The Dead Man's Pond Variation would not parallel any existing corridors.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-

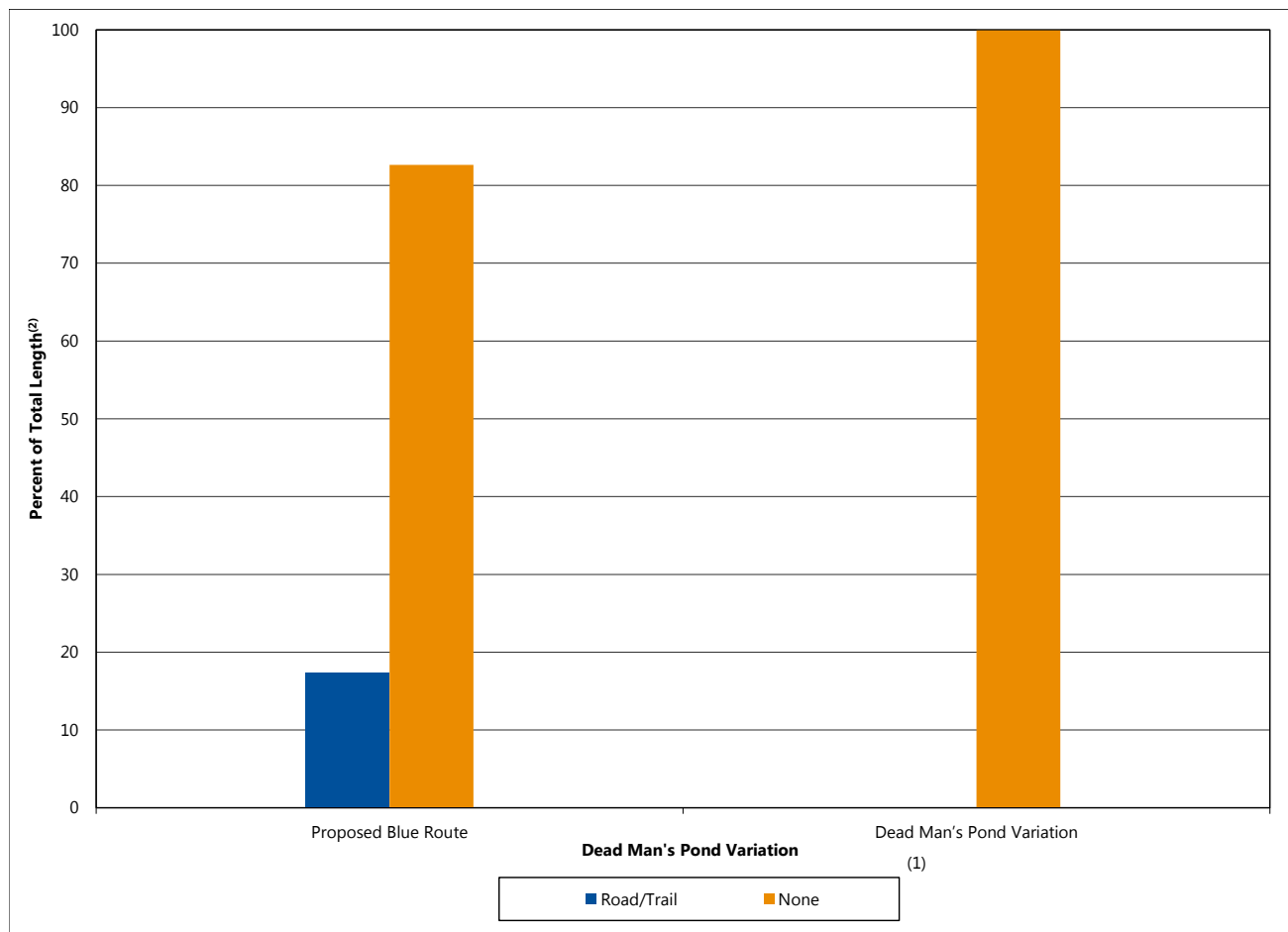
Table 6-202 Corridor Sharing in the Dead Man's Pond Variation Area

Feature Sharing Corridor ⁽¹⁾	Evaluation Parameter	Dead Mans's Pond Variation Area	
		Proposed Blue Route	Dead Man's Pond Variation
Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field line, PLSS)	Percent of Total Length ⁽²⁾	0	0
Road/Trail (other linear features, but not transmission lines, may be present within the road/trail corridor; i.e., PLSS, field line)	Percent of Total Length ⁽²⁾	17	0
None	Percent of Total Length ⁽²⁾	83	100

Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

Note(s): Totals may not sum due to rounding

- (1) More than one feature may share the corridor; the primary feature within the corridor is identified, other features that may share the corridor are listed in parenthesis. Appendix E provides a detailed summary of all shared features.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-129 Corridor Sharing in the Dead Man's Pond Variation Area


Source(s): : USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

Note(s): Totals may not sum due to rounding

- (1) Road/Trail (other linear features, but not transmission lines, may be present within the road/trail corridor; i.e., PLSS, field line).
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

term impacts on corridor sharing are summarized in Section 5.3.6. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on corridor sharing from the proposed Project.

6.4.4.7 Costs of Constructing, Operating, and Maintaining the Facility which are Dependent on Design and Route

Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-203 summarizes the costs associated with constructing the Proposed Blue Route and Dead Man's Pond Variation in the Dead Man's Pond Variation Area. As indicated in Table 6-203, the Dead Man's Pond Variation would cost more to construct relative to the Proposed Blue Route.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$3,500 to \$3,700 annually for these alternatives in the Dead Man's Pond Variation Area.

6.4.5 Blackberry Variation Area

The Blackberry Variation Area encompasses two route alternatives: the Proposed Blue Route and the Proposed Orange Route. This section provides a comparison of the potential impacts resulting from construction, operation, maintenance, and emergency repair of the proposed Project within the Blackberry Variation Area, depending on the route or variation considered.

6.4.5.1 Human Settlement

This section describes the aesthetic resources and zoning and land use compatibility within the Blackberry Variation Area and the potential impacts from the proposed Project.

Aesthetics

As described in the Aesthetics discussion for the Effie Variation Area (see Section 6.4.1.1), impacts on aesthetic resources would be determined based largely on the level of increased contrast produced by the proposed Project in views by sensitive viewers. Residences and other aesthetic resources within 1,500 feet of the anticipated alignment would have a high probability of having views of the proposed Project and as described in Section 5.3.1.1, this distance is considered the ROI. Data related to aesthetic resources in the Blackberry Variation Area are summarized in Table 6-204 and shown on Maps 6-61, 6-62, 6-63, and 6-65.

As indicated in Table 6-204 for the Blackberry Variation Area, both the Proposed Blue Route and Proposed Orange Route would cross or be located within 1,500 feet of a snowmobile trail and within one mile of historic architectural sites (Map 6-62 and Map 6-65), which are aesthetic resources with high visual sensitivity. The Proposed Blue Route would be located within one mile of six historic architectural sites, whereas the Proposed Orange Route would be located within one mile of one historic architectural site (Map 6-62). Therefore, the Proposed Orange Route would affect fewer aesthetic resources than the Proposed Blue Route.

In addition, the alternatives would be located within 1,500 feet of a number of residences, which also have high visual sensitivity (Figure 6-130). Of the two proposed routes in the Blackberry Variation Area, the Proposed Blue Route would affect fewer total residences (11) within 1,500 feet than the Proposed Orange Route (22). While there are no residences located within the ROW of the Proposed Blue Route, there are two residences located within 500 feet of the anticipated alignment, which would have high visual sensitivity.

The Proposed Orange Route is slightly longer (6.1 miles) than the Proposed Blue Route (5.4 miles; Table 6-204) and both alternatives parallel existing large transmission lines for a portion of their entire lengths at 37 and 20 percent, respectively. Although the Proposed Orange Route parallels an existing large transmission line for a greater percentage of its length than the Proposed Blue Route (Table 6-204),

Table 6-203 Construction Costs in the Dead Man's Pond Variation Area

Variation Area	Name in the EIS	Cost (Total)	Average Cost (per mile)	Length (mi)
Dead Man's Pond	Proposed Blue Route	\$2,873,223	\$1,306,011	2.2
	Dead Man's Pond Variation	\$4,409,841	\$1,934,141	2.3

Source(s): Minnesota Power 2015, reference (9)

Table 6-204 Aesthetic Resources within the ROI in the Blackberry Variation Area

Resource	Evaluation Parameter ⁽¹⁾	Blackberry Variation Area	
		Proposed Blue Route	Proposed Orange Route
Transmission Line	Length (mi)	5.4	6.1
Existing Transmission Line ⁽²⁾	Percent of Total Length ⁽³⁾	20	37
Residences	Count within 0–500 ft	2	0
	Count within 0–1,000 ft	6	5
	Count within 0–1,500 ft	11	22
Historic Architectural Sites	Count within 0–1,500 ft	0	0
	Count within 0–5,280 ft	6	1
Snowmobile Trails	Count within 0–1,500 ft	1	1

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); Minnesota Power 2014, reference (146); SHPO 2014, reference (147); MnDNR 2010, reference (150)

Note(s): Totals may not sum due to rounding

- (1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0-500 ft includes 500 ft on each side of the anticipated alignment.
- (2) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (3) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

the Proposed Blue Route parallels a 230 kV line with a more similar structure design, while the Proposed Orange Route parallels a 69 kV or 115 kV line which has a somewhat different structure design. By paralleling an existing 230 kV line of more similar design, the Proposed Blue Route is likely to produce slightly less design contrast in terms of its form, line, and scale than the Proposed Orange Route. However, given that the Proposed Orange Route parallels an existing large transmission line for nearly twice the distance as the Proposed Blue Route, the Proposed Orange Route would likely produce less contrast overall than the Proposed Blue Route.

Although the Proposed Orange Route affects more residences within 1,500 feet of it (22) than the Proposed Blue Route (11), it affects slightly fewer other aesthetic resources (one historic architectural sites and one snowmobile trail) and would likely produce less contrast by paralleling an existing large transmission line for a greater percentage of its length than the Proposed Blue Route. For these reasons, the Proposed Orange Route is likely to result in slightly less aesthetic impact than the Proposed Blue Route in the Blackberry Variation Area.

The Proposed Blue Route and Proposed Orange Route are short in length, they only parallel existing transmission lines of similar size and design for moderately short portions of their overall lengths, and affect a moderate number of residences and several other sensitive visual resources. For these reasons, potential aesthetic impacts of the Proposed Blue Route and Proposed Orange Route are expected to be significant.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on aesthetics are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

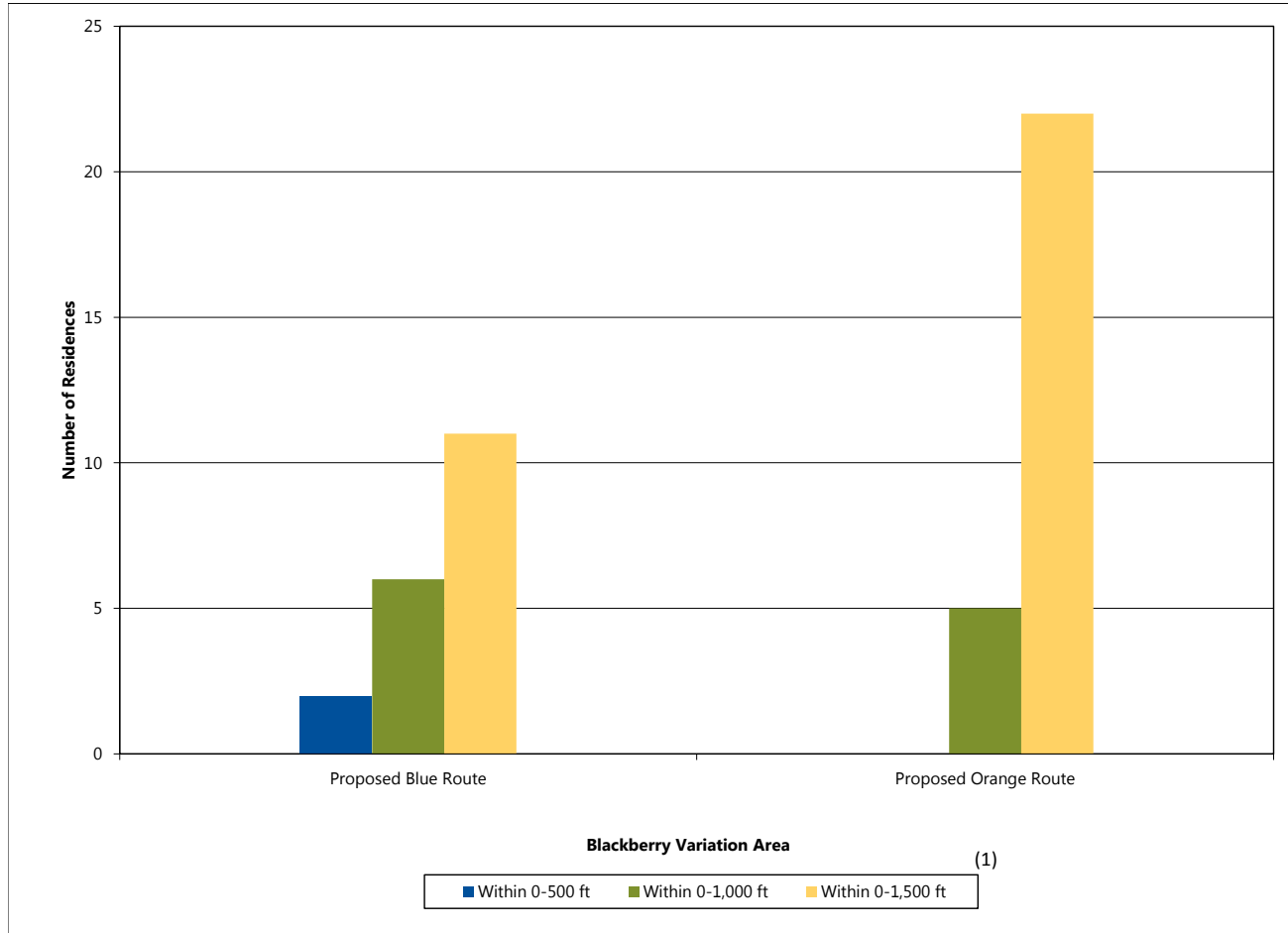
Land Use Compatibility

As explained in Section 5.3.1.1, the ROI for Land Use Compatibility was determined to be 1,500 feet from the anticipated alignments of the proposed Project.

Land Uses

Table 6-205 identifies the amount of each type of land cover within 1,500 feet of the anticipated alignments of the Proposed Blue Route and Proposed Orange Route in the Blackberry Variation Area. Generally, the percentage of each land use is representative of what is present within the ROW. The various land uses present in the variation area are shown in Map 5-19 and residences, churches, cemeteries, and airports near the Proposed Blue Route and Proposed Orange Route are shown on Map 6-61.

The Proposed Blue Route and Proposed Orange Routes ROI are both primarily composed of forested and/or swamp land (Table 6-205). The Proposed Orange Route ROI contains slightly less forested/swamp land, agricultural land, and developed or disturbed land compared to the Proposed Blue Route.

Figure 6-130 Residences within the ROI in the Blackberry Variation Area


Source(s): Minnesota Power 2014, reference (146)

Note(s): Totals may not sum due to rounding

- (1) Area/Count within a distance includes both sides of the anticipated alignment. For example, count within 0-500 ft includes 500 ft on each side of the anticipated alignment.

Table 6-205 Land Uses within the ROI in the Blackberry Variation Area

Resource	Type ⁽¹⁾	Evaluation Parameter ⁽²⁾	Blackberry Variation Area	
			Proposed Blue Route	Proposed Orange Route
GAP Land Cover Vegetation Class Level - Division 4	Total	Acres within 0–1,500 ft	2,127	2,353
	Developed or Disturbed	Acres within 0–1,500 ft	56	78
	Agricultural	Acres within 0–1,500 ft	50	192
	Forested and/or Swamp	Acres within 0–1,500 ft	2,004	1,982
	Other	Acres within 0–1,500 ft	17	101

Source(s): USGS 2001, reference (151)

Note(s): Totals may not sum due to rounding

- (1) Other category includes: Open water, Great Plains Grassland and Shrubland and Introduced and Semi-Natural Vegetation. See detailed summary of all types in Appendix E.
- (2) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

Land Ownership and Management

Table 6-206 and Figure 6-131 show that the Proposed Orange Route has a slightly greater amount of state fee land compared to the Proposed Blue Route. None of the land within either ROW is state forest land. No impacts to county lands, state conservation easements or USFWS Interest Lands would occur under the Proposed Blue Route or Proposed Orange Route.

Approximately 37 percent of the Proposed Orange Route and 20 percent of the Proposed Blue Route would parallel an existing corridor (see Section 6.4.5.6). Therefore the Proposed Orange Route would be expected to have slightly less incompatibility with surrounding land uses compared to the Proposed Blue Route.

Impacts to land use from the proposed Project in the Blackberry Variation Area would be similar to those described in Section 6.2.1.1. The Proposed Blue Route and Proposed Orange Route would both result in a long-term change in land use for areas currently forested and/or swamp land, but these changes would be limited in extent, and there would still be extensive forest and swamp lands in the surrounding area; so these changes are expected to have a minimal impact on land use. The length of the alternative that would parallel an existing corridor is also important. The Proposed Blue Route avoids a greater amount of state forest and state fee lands than the Proposed Orange Route thereby avoiding long-term changes to land use. However, the Proposed Orange Route parallels an existing corridor for a greater percentage of its length as compared to the Proposed Blue Route.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on land use are summarized in Section 5.3.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.4.5.2 Land-Based Economies

This section describes the land-based economy resources, including agriculture, forestry, and mining, within the Blackberry Lake Variation Area and the potential impacts from the proposed Project on those resources. Data related to land-based economy resources in the Blackberry Variation Area are summarized in Table 6-207.

Agriculture

As identified in Section 5.3.2.1, the ROI for evaluating agricultural impacts is the ROW of the

transmission line. Table 6-207 and Figure 6-132 show the acreage of USDA-NRCS-classified prime farmland, prime farmland if drained, and farmland of statewide importance that would be impacted by the Proposed Blue Route and Proposed Orange Route in the ROI.

The Proposed Orange Route would pass through more farmland, including prime farmland (Figure 6-132). The Proposed Orange Route and Proposed Blue Route would each impact less than 15 acres of farmland of statewide importance. The Proposed Blue Route, which would have the shorter length, would be expected to have fewer impacts on farmland.

As discussed in Section 5.3.2.1, construction activities could limit the use of fields or could affect crops and soil by compacting soil, generating dust, damaging crops or drain tile, or causing erosion. Construction activities would also cause long-term adverse impacts to agriculture by the potential loss of income due to the removal of farmland for transmission line structures and associated facilities. Maintenance and emergency repair activities could result in direct adverse impacts on farmlands from the removal of crops, localized physical disturbance, and soil compaction caused by equipment.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on agricultural resources are summarized in Section 5.3.2.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Forestry

As identified in Section 5.3.2.2, the ROI for evaluating forestry impacts from the proposed Project is the ROW of the transmission line. There are no state forest lands or USDA-USFS national forest lands within the ROI of the Proposed Blue Route, Proposed Orange Route in the Blackberry Variation Area.

Mining and Mineral Resources

As identified in Section 5.3.2.3, the ROI for evaluating mining and mineral resource impacts from the proposed Project is the ROW of the transmission line. Table 6-207, Figure 6-133, and Map 6-61 identify the acreage of mining lands with terminated/expired state mineral leases that may be impacted in the Blackberry Variation Area. There are no **active mineral leases**, known aggregate resources or current mining lands in the ROI of either of the proposed routes in the Blackberry Variation.

Table 6-206 Land Ownership/Management within the Anticipated ROW in the Blackberry Variation Area

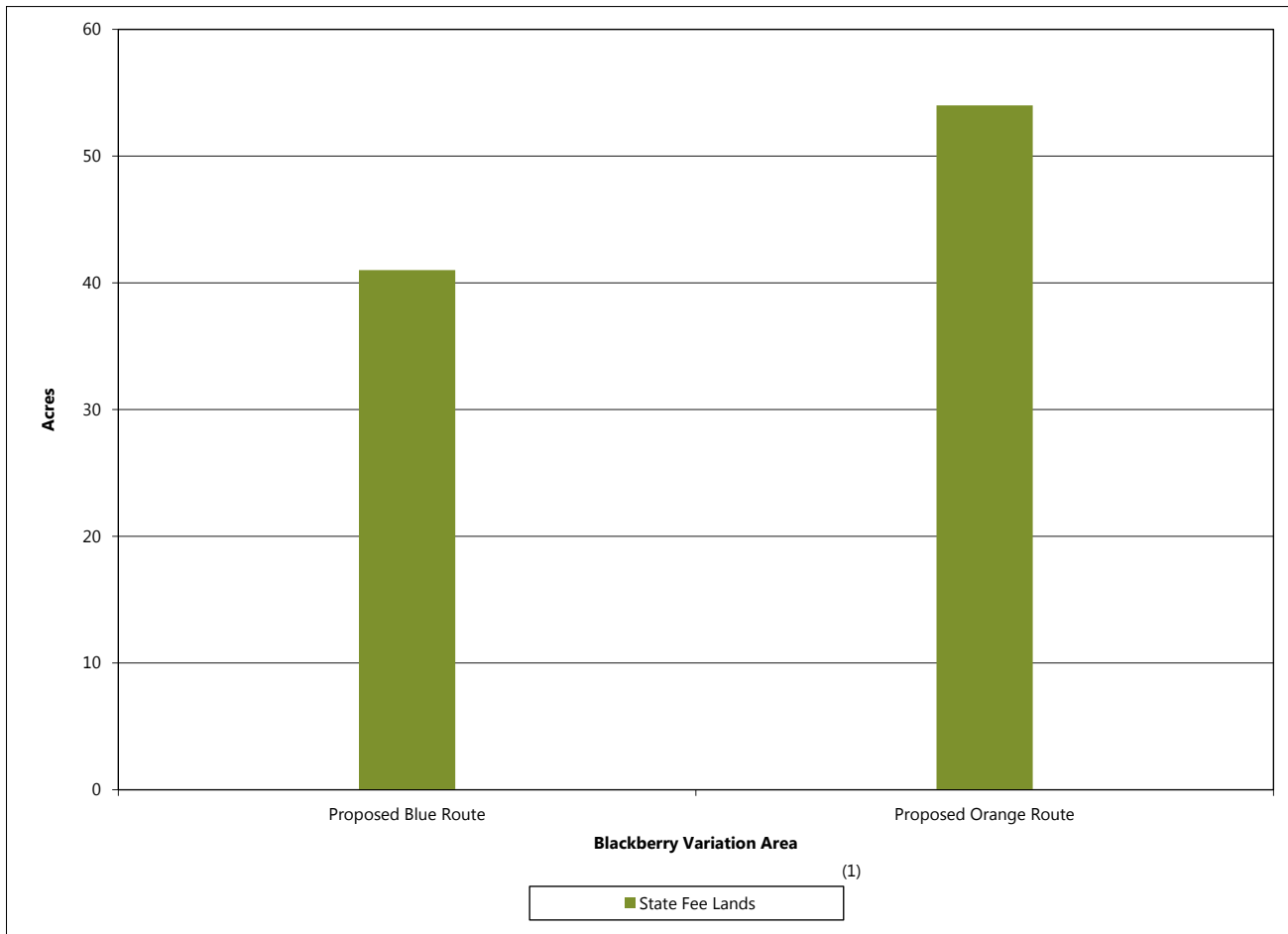
Resource	Type	Evaluation Parameter	Blackberry Variation Area	
			Proposed Blue Route	Proposed Orange Route
Total Lands	--	Acres within ROW	133	147
State Fee Lands ⁽¹⁾ Total	--	Acres within ROW	41	54
State Fee Lands ⁽¹⁾ by Type	Consolidated Conservation	Acres within ROW	0	0
	Other - Acquired, Tax Forfeit, Volstead	Acres within ROW	17	49
	Trust Fund	Acres within ROW	24	5
	Federal - State Lease	Acres within ROW	0	0
Private Land ⁽²⁾	--	Acres within ROW	92	93

Source(s): MnDNR 2014, reference (152)

Note(s): Totals may not sum due to rounding

- (1) This dataset represents state land ownership using public land survey quarter-quarter sections as the smallest unit. In some cases, multiple state lands are located within a single quarter-quarter section. Therefore, features may be duplicated and the analysis results may over-represent potential impacts.
- (2) Acreage for private lands was calculated as the difference between total lands and public lands.

Figure 6-131 Public Land Ownership/Management within the ROI in the Blackberry Variation Area



Source(s): MnDNR 2014, reference (152)

Note(s): Totals may not sum due to rounding

- (1) This dataset represents state land ownership using public land survey quarter-quarter sections as the smallest unit. In some cases, multiple state lands are located within a single quarter-quarter section. Therefore, features may be duplicated and the analysis results may over-represent potential impacts.

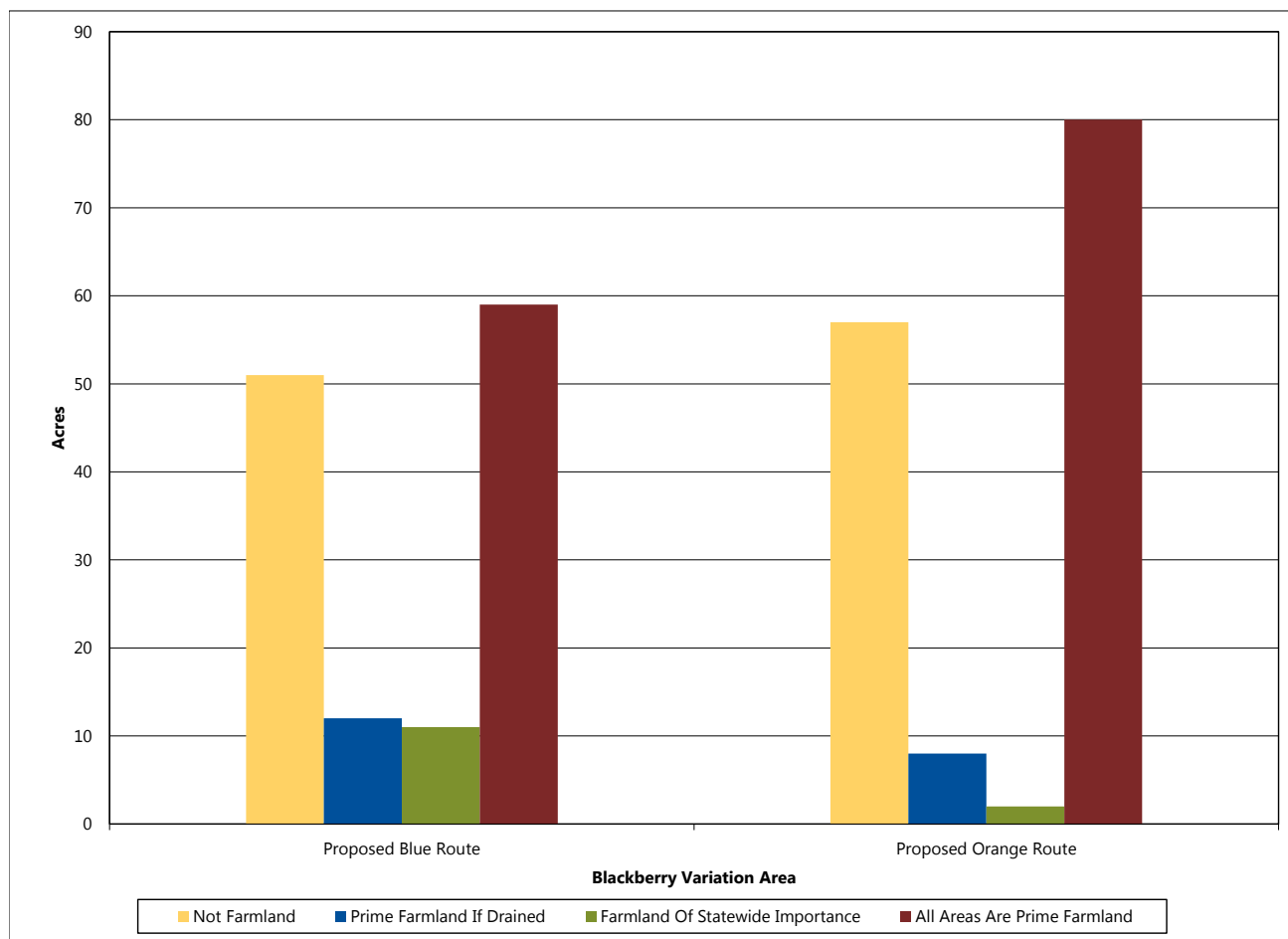
Table 6-207 Land-Based Economy Resources within the Anticipated ROW in the Blackberry Variation Area

Resource	Type	Evaluation Parameter	Blackberry Variation Area	
			Proposed Blue Route	Proposed Orange Route
Transmission Line	--	Length (mi)	5.4	6.1
Existing Transmission Line ⁽¹⁾	--	Percent of Total Length ⁽²⁾	20	37
Farmland	Not Farmland	Acres within ROW	51	57
	Prime Farmland if Drained	Acres within ROW	12	8
	Farmland of Statewide Importance	Acres within ROW	11	2
	All Areas are Prime Farmland	Acres within ROW	59	80
State Mineral Leases (active/and/or expired/terminated)	--	Acres within ROW	37	33

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USDA NRCS 2014, reference (154); MnDNR 2014, reference (179)

Note(s): Totals may not sum due to rounding

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Figure 6-132 Acres of Farmland by Type within the Anticipated ROW in the Blackberry Variation Area


Source(s): USDA NRCS 2014, reference (154)

Note(s): Totals may not sum due to rounding

Both the Proposed Blue Route and the Proposed Orange Route would traverse mining lands with terminated/expired state mineral leases, with the Proposed Blue Route passing through slightly more acres than the Proposed Orange Route (Table 6-207, Figure 6-133, and Map 6-61). Both of the proposed routes in the Blackberry Variation Area could potentially interfere with future mining activities in this area.

As discussed in Section 5.3.2.3, construction of transmission lines could affect future mining operations if the structures interfere with access to mineable resources or the ability to remove these resources.

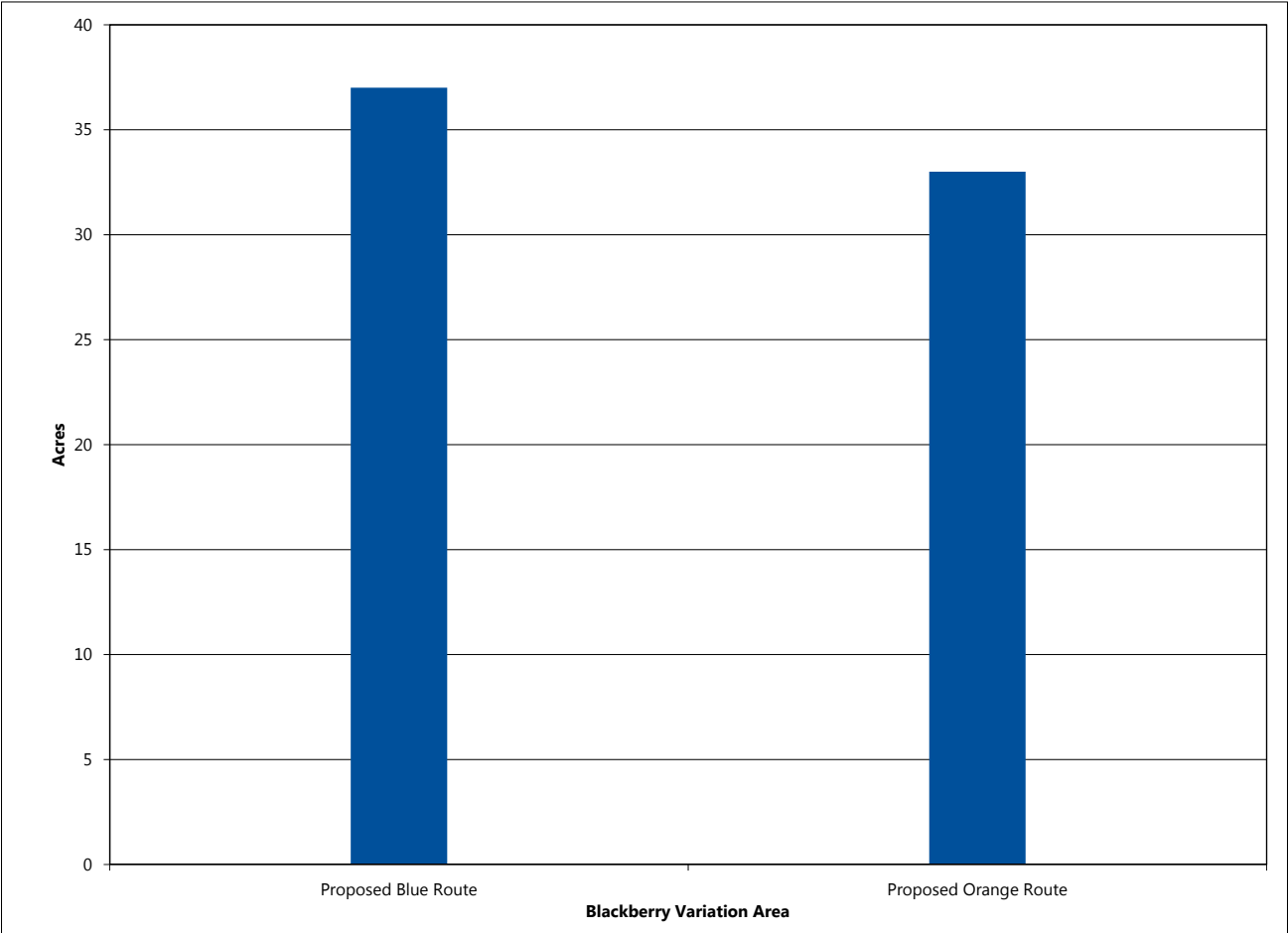
Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on mining and mineral resources are summarized in Section 5.3.2.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.4.5.3 Archaeology and Historic Architectural Sites

As described in Section 6.2.1.3, the APE for potential direct impacts to archaeological and historic architectural resources includes the ROW of the proposed transmission line; however, potential indirect impacts to historic architectural sites are evaluated within one mile from the anticipated alignment since visual intrusions can change the context and setting of historic architectural sites.

Table 6-208 provides a summary of the previously recorded archaeological sites and historic architectural resources within the ROW (direct APE) and within 1,500 feet and one mile of the anticipated alignments (indirect APE) for the Proposed Blue Route and Proposed Orange Route in the Blackberry Variation Area (Map 6-62). A more detailed description of these resources can be found in the Phase IA cultural resources survey report located in Appendix P.

Figure 6-133 Acres of State Mineral Leases within the Anticipated ROW in the Blackberry Variation Area



Source(s): MnDNR 2014, reference (179)

Table 6-208 Archaeological and Historic Resources within the Blackberry Variation Area

Resource	Evaluation Parameter ⁽¹⁾	Blackberry Variation Area	
		Proposed Blue Route	Proposed Orange Route
Historic Architectural Sites	Count within ROW	0	0
	Count within 0–1,500 ft	0	0
	Count within 0–5,280 ft	6	1
Archaeological Sites	Count within ROW	0	0
	Count within 0–1,500 ft	0	0

Source(s): SHPO 2014, reference (147); SHPO 2014, reference (155); SHPO 2014, reference (156)

Note(s): Totals may not sum due to rounding

(1) Acre/Count within a distance includes both sides of the anticipated alignment. For example, count within 0–500 ft includes 500 ft on each side of the anticipated alignment.

To date, no specific Native American resources have been previously recorded within the ROW (direct APE for cultural resources) or within one mile of the anticipated alignment (indirect APE for historic architectural resources or Native American resources) for the Proposed Blue Route and Proposed Orange Route in the Blackberry Variation Area. However, DOE is continuing to consult with federally recognized Indian tribes to identify Native American resources within the direct and indirect APEs for the proposed Project.

Within the Blackberry Variation Area, there are no archaeological sites or historic architectural resources within the ROW of either the Proposed Blue Route or the Proposed Orange Route. More historic architectural sites are potentially present within the Proposed Blue Route than the indirect APE for the Proposed Orange Route. None of the six previously recorded historic architectural resources located within the Proposed Blue Route indirect APE (IC-UOG-013, IC-TLT-011, IC-TLT-004, IC-TLT-005, IC-TLT-009, and IC-TLT-010) have been evaluated for NRHP eligibility. The Proposed Orange Route also contains IC-TLT-0110 within the indirect APE, which has not been evaluated for NRHP eligibility.

There is currently no known potential for direct, long-term adverse impacts as there are no previously recorded archaeological sites or historic resources located within the ROW of the proposed Blue Route or Orange Route. Indirect, long-term, adverse visual impacts on the previously recorded historic architectural resources within the indirect APE are likely to occur wherever the proposed Project is visibly prominent in the landscape or a viewshed and appears inconsistent with the existing setting of the architectural resources or within views to and from the architectural resources. Since the indirect APEs for both the Proposed Blue Route and the Proposed Orange Route contain historic architectural sites that have not been evaluated for

NRHP-eligibility, the proposed Project may result in changes to the setting of these resources that could be considered an adverse impact under Section 106 of the NHPA if these historic architectural sites are determined NRHP-eligible and if setting is determined to be a character defining feature that contributes to the significance of the resource.

The Proposed Blue Route and Proposed Orange Route have not been surveyed for cultural resources. As such, archaeological surveys, architectural surveys or inventories, and surveys or inventories for Native American resources will be required as part of cultural resources investigations conducted in compliance with federal and/or state regulations for archaeological resources and historic architectural sites. These cultural resource investigations will be implemented as part of DOE's Draft PA (Appendix V) that will establish a process to identify cultural resources within the APE for the proposed Project, evaluate the NRHP-eligibility of identified cultural resources, and develop measures to avoid, minimize, or mitigate potential adverse impacts on historic properties as a result of construction and operation of the proposed Project.

Potential short-term and long-term adverse impacts from construction, operation, maintenance, and emergency-repair related activities to historic and cultural properties are summarized in Section 5.3.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate adverse impacts to these resources, including TCPs, from the proposed Project.

6.4.5.4 Natural Environment

This section describes the water, vegetation, and wildlife resources within the Blackberry Variation Area and the potential impacts from the proposed Project.

Water Resources

As explained in Section 5.3.4.1, the ROI for water resources was determined to be the ROW of the transmission line. Data related to the ROI for water resources in the Blackberry Variation Area are summarized in Table 6-209 and shown on Map 6-63. Additional, water resources data beyond those resources present in the ROI of this variation area are provided in Appendix E.

The need to place transmission structures in wetlands, type of water crossings, and quantity of wetland type conversion are the primary water resources impacts that would differ between the Proposed Blue Route and the Proposed Orange Route in the Blackberry Variation Area. Neither the Proposed Blue Route nor the Proposed Orange Route ROWs contain non-PWI waters, trout streams, or floodplains.

The Proposed Blue Route and the Proposed Orange Route would each cross the Swan River, which is both a PWI water and a MPCA-listed impaired water (Table 5-32). The Proposed Orange Route would also cross a PWI unnamed tributary to the Swan River and Foot Lake (Figure 6-134).

It is anticipated that all PWI crossings are spannable (crossings would be less than the average spanning length of 1,250 feet) and that transmission structures would not be placed within them.

Based on the NWI, the Proposed Blue Route and the Proposed Orange Route would both require conversion of forested and shrub wetland areas to an herbaceous wetland type through removal of woody vegetation in the ROW. As shown in Figure 6-135, the Proposed Blue Route contains the most forested and shrub wetland and would result in the greatest amount of wetland type conversion. While these direct, adverse impacts to forested and shrub wetlands would be permanent and may change wetland functions within the ROW, e.g. altering the hydrology and habitat, they are

expected to be minimal because of the amount of surrounding shrub and forested wetlands in the region. Changes in wetland function are discussed in Section 5.3.4.1.

The Applicant would need to mitigate for these impacts, as summarized in Section 5.3.4.1. The Proposed Blue Route and the Proposed Orange Route would both require placement of fill in wetlands for construction of transmission structures, but this impact would be expected to be minimal because of its localized extent (33 square feet per structure). Impacts associated with fill would be minimized by spanning wetlands to the extent practical; however, this impact cannot be completely avoided by spanning due to the high number of wetland crossings that would be needed in the East Section. Due to the number of wetland complexes in the area, it would be expected that the Proposed Blue Route and the Proposed Orange Route would both require temporary construction access through wetlands, which would be expected to be minimal due to the short-term, localized nature of the impact.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on water resources are summarized in Section 5.3.4.1. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Vegetation

In Section 5.3.4.2, the ROI to assess impacts to vegetation was determined to be the ROW of the proposed transmission line. Data related to the ROI for vegetation in the Blackberry Variation Area are summarized in Table 6-210 and shown on Maps 5-19 and 6-63. Additional vegetation data beyond the dominant land cover types present in the ROI in this variation area are provided in Appendix E.

In general, loss or fragmentation of forest would be similar with either of the Proposed Blue Route

Table 6-209 Water Resources within the Anticipated ROW in the Blackberry Variation Area

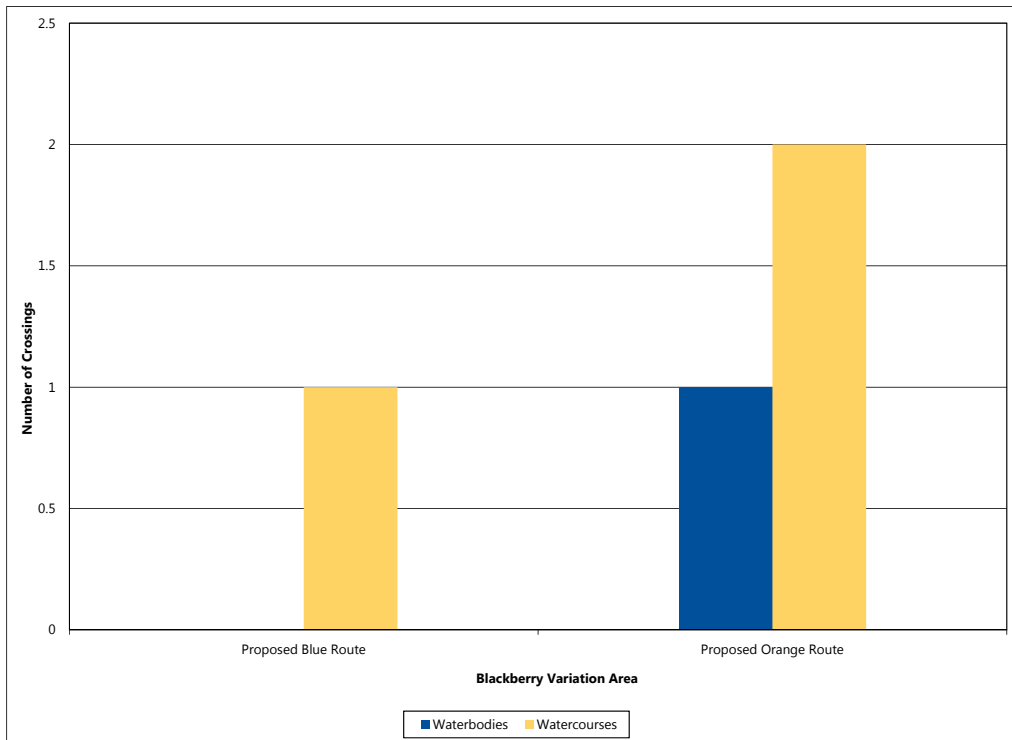
Resource	Evaluation Parameter	Blackberry Variation Area	
		Proposed Blue Route	Proposed Orange Route
Transmission Line	Length (mi)	5.4	6.1
Non-PWI Waters ⁽¹⁾	Number of Crossings	1	3
Impaired Waters	Number of Crossings	1	1
NWI Wetlands	Acres within ROW	51	40

Sources: USFWS 1997, reference (157); USGS 2014, reference (158); USGS 2014, reference (159); Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162); MPCA 2014, reference (119); MPCA 2014, reference (118)

Note(s): Totals may not sum due to rounding

(1) PWI waters include watercourses, waterbodies, and wetlands, as described in Chapter 5. The number of each type of PWI water that the Proposed Route and variations would cross are described in the text and Figure 6-134.

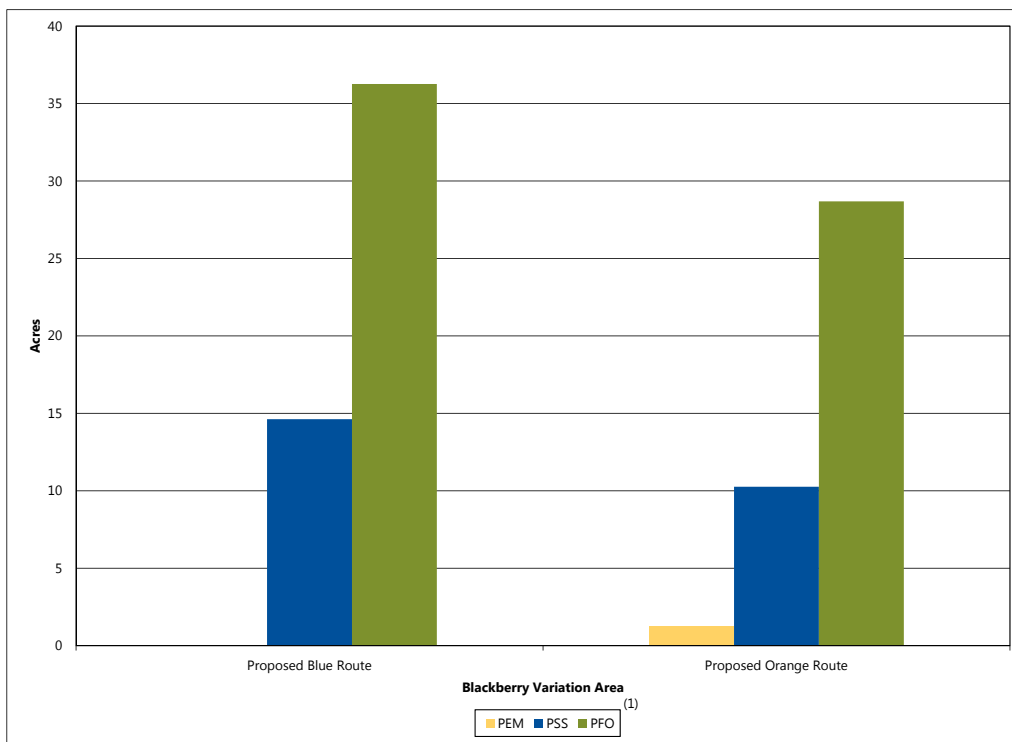
Figure 6-134 PWI Water Crossings by type in the Blackberry Variation Area



Source(s): USGS 2014, reference (158); USGS 2014, reference (159); MnDNR 2008, reference (160); MnDNR 2008, reference (161); MnDNR 2008, reference (162)

Note(s): Totals may not sum due to rounding

Figure 6-135 Acres of Wetland by Type within the Anticipated ROW in the Blackberry Variation Area



Source(s): USFWS 1997, reference (157)

Note(s): Totals may not sum due to rounding

(1) Palustrine emergent wetland (PEM), palustrine shrub wetland (PSS), palustrine forested wetland (PFO).

and the Proposed Orange Route in the Blackberry Variation Area. As discussed in Section 5.3.4.2, the Applicant would permanently clear woody vegetation from the ROW during construction and the ROW would be maintained as low-stature vegetation in order to reduce interference with the maintenance and function of the transmission line.

As indicated in Table 6-210, the Proposed Blue Route and the Proposed Orange Route would pass through a similar amount of forested land. The Proposed Blue Route is 0.7 miles shorter than the Proposed Orange Route but it only parallels an existing transmission line corridor for 20 percent of its length, while the Proposed Orange would parallel an existing transmission line for 37 percent of its length. Proposed Blue Route and Proposed Orange Route would likely result in similar fragmentation of intact forest in areas where forest vegetation is present. While direct, adverse impacts to forested areas would be long-term, contiguous forest is abundant in the region surrounding the proposed Project (Map 5-19).

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on vegetation resources are summarized in Section 5.3.4.2. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Wildlife

The ROI for wildlife was determined in Section 5.3.4.3 to be the ROW of the proposed transmission line. Data related to wildlife resources in the Blackberry Variation Area are summarized in Table 6-211 and shown on Map 6-63. Wildlife resources in the

Blackberry Variation Area consist of natural habitat, including forest, wetlands, and small lakes.

The primary impact on wildlife resources that would differ between the Proposed Blue Route and the Proposed Orange Route in the Blackberry Variation Area includes proximity to wildlife habitat. As discussed in Section 5.3.4.3, the proposed Project would expand existing corridor or create new corridor; this would result in conversion from forest to low-stature open vegetation communities, favoring wildlife species that prefer more open vegetation communities. Section 6.4.5 (Vegetation) summarizes potential impacts on forested vegetation from the Proposed Blue Route and the Proposed Orange Route.

The Proposed Blue Route is just under a mile shorter in length but would require creation of new corridor for a greater portion of its length than the Proposed Orange Route (Table 6-211; Map 6-63). Because of this, the impacts related to fragmentation of forested habitats, and subsequent displacement of wildlife species associated with those forest communities would be similar with either proposed route.

Several small lakes/ponds are present in the Blackberry Variation Area, including a MnDNR designated unnamed shallow lake (Map 6-63). The Proposed Orange Route would traverse an area where these waterbodies are more dominant. Although none of these waterbodies are present within the ROW of either the Proposed Blue Route or the Proposed Orange Route, the proximity of these waterbodies to the Proposed Orange Route could result in greater impacts on wildlife that are associated with these waterbodies.

Table 6-210 Vegetation Resources within the Anticipated ROW in the Blackberry Variation Area

Resource	Evaluation Parameter	Blackberry Variation Area	
		Proposed Blue Route	Proposed Orange Route
Transmission Line	Length (mi)	5.4	6.1
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	20	37
Total Forested GAP Land Cover	Acres within ROW	129	130
GAP Land Cover - Dominant Types⁽³⁾			
North American Boreal Forest	Acres within ROW	60	52
North American Boreal Flooded and Swamp Forest	Acres within ROW	30	26
Eastern North American Cool Temperate Forest	Acres within ROW	33	49

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); USGS 2001, reference (151)

Note(s): Totals may not sum due to rounding

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) Data presented here only includes dominant GAP types; see Appendix E for additional land cover types within the ROW.

Table 6-211 Wildlife Resources within the Vicinity of the Blackberry Variation Area

Resource	Evaluation Parameter	Blackberry Variation Area	
		Proposed Blue Route	Proposed Orange Route
Transmission Line	Length (mi)	5.4	6.1
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	20	37

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145)

Note(s): Totals may not sum due to rounding

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Table 6-212 Rare Species Documented within One Mile of the Anticipated ROW in the Blackberry Variation Area

Scientific Name ⁽¹⁾	Common Name	Federal Status	State Status	Type	Blackberry Variation Area	
					Proposed Blue Route	Proposed Orange Route
<i>Platanthera flava</i> var. <i>herbiola</i>	Tubercled Rein-orchid	None	Threatened	Vascular Plant	X	X
<i>Spiranthes casei</i> var. <i>casei</i>	Cases's Ladies'-tresses	None	Threatened	Vascular Plant	X	X
<i>Accipiter gentilis</i>	Northern Goshawk	None	Special Concern	Bird		X

Source(s): MnDNR **2015**, reference (132)

- (1) Canada lynx and gray wolf records are not documented in the NHIS database.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on wildlife resources are summarized in Section 5.3.4.3. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project. Section 6.2.1.4 (Wildlife) discusses additional suggested measures to avoid, minimize, or mitigate impacts on wildlife are summarized.

6.4.5.5 Rare and Unique Natural Resources

Rare and unique natural resources are divided into rare species and rare communities. Rare species encompass federally listed or state endangered, threatened, or special concern species while rare communities may include state-designated features, such as SNAs, MBS Sites of Biodiversity Significance, MnDNR High Conservation Value Forest, MnDNR Ecologically Important Lowland Conifer stands, and MBS native plant communities.

Rare Species

The ROI for rare species is described in Section 5.3.5, which states that for impacts to federally and state-listed species, the ROI includes a one-mile buffer surrounding the proposed routes and variations. Data related to rare species in the Blackberry Variation Area are summarized in Table 6-212; additional data on rare species, such as the

presence of MnDNR tracked species, is provided in Appendix F. As a condition of the license agreement with MnDNR for access to the NHIS database, data pertaining to the documented locations of rare species are not shown on a map.

In general, proximity of state endangered, threatened, or special concern species is similar between the Proposed Blue Route and the Proposed Orange Route in the Blackberry Variation Area. As discussed in Section 5.3.5, potential long-term impacts on rare species from the proposed Project include the direct or indirect loss of individuals or conversion of associated habitats and increased habitat fragmentation from construction.

As indicated in Table 6-212, two state-threatened vascular plants have been documented within one mile of the Proposed Blue Route and the Proposed Orange Route. In addition, the northern goshawk has been documented within one mile of the Proposed Orange Route; however, preferred habitat for the northern goshawk (mature, closed canopy forest) is also likely available within the vicinity of the Proposed Blue Route.

Although the Proposed Blue Route is just under a mile shorter in length than the Proposed Orange Route, it would require creation of new corridor for a greater percentage of its length relative to the

Proposed Orange Route (Table 6-213). Clearing of forested areas to create new corridor could have impacts on rare species associated with forest communities, such as the northern goshawk. However, the full extent of potential impacts on rare species from either the Proposed Blue Route or the Proposed Orange Route cannot be determined without pre-construction field surveys, which would likely occur as a condition of a MN PUC Route Permit. The MN PUC Route Permit could require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

Any indirect impacts to rare species from the proposed Project are expected to be minimal because of the amount of surrounding habitat. Through use of Applicant proposed avoidance and minimization measures, direct impacts to rare species are not expected. DOE's informal consultation under Section 7 of the ESA with USFWS is currently on-going and a Biological Assessment has been prepared to assess potential impacts on federally listed species (Appendix R).

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on rare species are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

Rare Communities

The ROI for the analysis of impacts to rare communities was described within Section 5.3.5 and includes the ROW of the proposed transmission line. Data related to rare communities and resources in the Blackberry Variation Area are summarized in Table 6-213 and shown on Map 6-64; additional, more detailed data on rare communities and resources is provided in Appendix E.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts.

Loss or conversion of native vegetation would likely be similar between the Proposed Blue Route and the Proposed Orange Route in the Blackberry Variation Area. As discussed in Section 5.3.5, the Applicant would permanently remove vegetation at each structure footprint and within portions of the ROW that are currently dominated by forest or other woody vegetation.

As indicated on Map 6-64 and in Table 6-213, the Proposed Orange Route would pass through more MBS Sites of Biodiversity Significance. However, both Proposed Blue Route and the Proposed Orange Route would pass through a similar amount of Sites of Biodiversity Significance along new transmission line corridor because the Proposed Orange Route would parallel an existing transmission line corridor through a portion of the Sites of Biodiversity Significance it traverses.

The rare communities and resources listed in Table 6-213 and detailed above show that the proposed Project may result in direct, long-term, localized adverse impacts to rare communities. Some of these impacts may also have regional effects, because of the limited regional abundance and distribution of some of the rare communities affected. Therefore, adverse impacts to rare communities may be significant, because localized adverse impacts would result in a broader regional depletion of certain rare communities. The MN PUC Route Permit could require the development of a Vegetation Management Plan as a permit condition, which could include plant surveys along the permitted ROW.

Table 6-213 Rare Communities and Resources within the Vicinity of the Blackberry Variation Area

Resource	Evaluation Parameter	Blackberry Variation Area	
		Proposed Blue Route	Proposed Orange Route
Transmission Line	Length (mi)	5.4	6.1
Existing Transmission Line ⁽¹⁾	Percent of Total Length ⁽²⁾	20	37
MBS Sites of Biodiversity Significance ⁽³⁾	Acres within ROW	57	79

Source(s): Minnesota Power 2014, reference (144); MN DOC 2014, reference (145); MBS 2015, reference (167)

Note(s): Totals may not sum due to rounding

- (1) More than one feature often shares the corridor; a detailed summary of all the shared features are listed in Appendix E. This feature includes all situations where an existing transmission line is present.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.
- (3) MBS Sites of Biodiversity Significance data are preliminary in this portion of the proposed Project. Because of the preliminary status and/or unknown ranks, biodiversity significance ranks are not distinguished from one another here.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on rare communities are summarized in Section 5.3.5. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on these resources from the proposed Project.

6.4.5.6 Corridor Sharing

Sharing or paralleling existing corridors or linear features minimizes fragmentation of the landscape and can minimize impacts to adjacent property. The ROI for the analysis of corridor sharing generally includes infrastructure corridors within approximately 0.25 miles of the proposed routes and variations, as described in Section 5.3.6. Map 6-65 shows areas where the proposed route and variations would parallel corridors with existing transportation, transmission line, or other linear features in the Blackberry Variation Area.

Table 6-214 identifies the percentage of total transmission line length that the Proposed Blue Route and the Proposed Orange Route parallel an existing corridor or linear feature in the Blackberry Variation Area.

The Proposed Orange Route would parallel an existing transmission line corridor for less than half of the length (Figure 6-136). The Proposed Blue Route would parallel an existing transmission line corridor for one fifth of its length.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on corridor sharing are summarized in Section 5.3.6. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts on corridor sharing from the proposed Project.

6.4.5.7 Electrical System Reliability

As explained in Section 5.3.7, the ROI for Electrical System Reliability was determined to be the corridors for the existing transmission lines. Data related to electrical system reliability in the Blackberry Variation Area are shown on Map 6-65.

The Proposed Blue Route would parallel 230 kV and 115 kV transmission lines for approximately 20 percent of its length in the southern portion of the Blackberry Variation Area. The Proposed Orange Route would parallel two 115 kV transmission lines for approximately 40 percent of its length in the southern portion of the Balsam Variation Area (Table 6-214); therefore, for both proposed routes, there are three transmission lines are parallel in adjacent corridors.

The configuration may decrease the reliability of the proposed Project. When facilities are located in close proximity, there is a greater risk that a single event can take out multiple lines. Additionally, the close proximity of three lines can make repairing the lines more difficult. These difficulties could increase outage times, should an outage occur. Adverse impacts are possible as a result of the construction of the construction and operation of three high-voltage transmission lines under one variation in the East Section.

Potential construction, operation, maintenance, and emergency-repair related short-term and long-term impacts on electrical system reliability are summarized in Section 5.3.7. Section 2.13 summarizes Applicant-proposed measures to avoid, minimize, or mitigate impacts to electrical system reliability.

Table 6-214 Corridor Sharing in the Blackberry Variation Area

Feature Sharing Corridor ⁽¹⁾	Evaluation Parameter	Blackberry Variation Area	
		Proposed Blue Route	Proposed Orange Route
Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field line, PLSS)	Percent of Total Length ⁽²⁾	20	37
Road/Trail (other linear features, but not transmission lines, may be present within the road/trail corridor; i.e., PLSS)	Percent of Total Length ⁽²⁾	2	0
None	Percent of Total Length ⁽²⁾	79	63

Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

Note(s): Totals may not sum due to rounding

- (1) More than one feature may share the corridor; the primary feature within the corridor is identified, other features that may share the corridor are listed in parenthesis. Appendix E provides a detailed summary of all shared features.
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

6.4.5.8 Costs of Constructing, Operating, and Maintaining the Facility which are Dependent on Design and Route

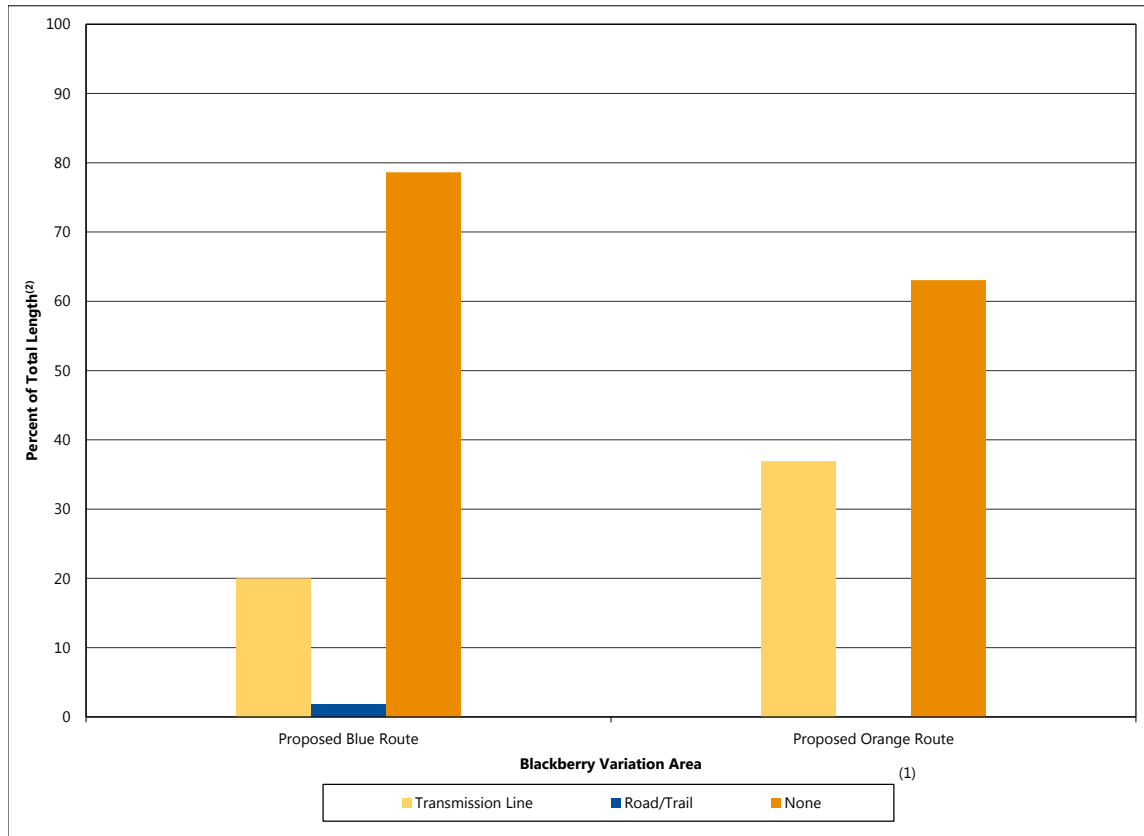
Information related to construction, operation, and maintenance costs associated with the proposed Project is provided in Section 5.3.8. Table 6-215 summarizes the costs associated with constructing the Proposed Blue Route and Proposed Orange Route in the Blackberry Variation Area. As indicated in Table 6-215, the Proposed Orange Route would cost more to construct relative to the Proposed Blue Route.

The cost for routine maintenance would depend on the topology and the type of maintenance required, but typically runs from \$1,100 to \$1,600 per mile annually (Minnesota Power 2013). Using the \$1,600 per mile for operation and maintenance, the estimated cost would range from \$8,600 to \$9,800 annually for these alternatives in the Blackberry Variation Area.

6.4.6 Relative Merits Summary

As discussed in Section 1.2.1.1, the MN PUC is charged with selecting routes that minimize adverse

Figure 6-136 Corridor Sharing in the Blackberry Variation Area



Source(s): USDA et al 2013, reference (170); MN DOC 2014, reference (145); MNDOT 2010, reference (171); MnDNR 2010, reference (172); MnDNR 2009 reference (173); MnDNR et al 2014, reference (174); MnDNR et al 2013, reference (175); MnDNR 2013, reference (176); MnDNR et al 2009, reference (177)

Note(s): Totals may not sum due to rounding

- (1) Transmission Line (other linear features may be present within the transmission line corridor; i.e., road, trail, field line, PLSS); Road Trail (other linear features, but not transmission lines, may be present within the road/trail corridor; i.e., PLSS field line).
- (2) Percent of total length was calculated by rounding any values less than 0.5 to 0, this may result in a total of slightly more or less than 100 percent.

Table 6-215 Construction Costs in the Blackberry Variation Area

Variation Area	Name in the EIS	Cost (Total)	Average Cost (per mile)	Length (mi)
Blackberry	Proposed Blue Route	\$8,380,680	\$1,540,566	5.4
	Proposed Orange Route	\$10,148,060	\$1,663,616	6.1

Source(s): Minnesota Power 2015, reference (9)

human and environmental impacts while ensuring continuing electric power system reliability and integrity. MN PUC must take into account the 14 factors identified in Minnesota Rules, part 7850.4100 when making a decision on a Route Permit. See Section 6.2.6 for additional details on the relative merits analysis methodology.

6.4.6.1 Effie Variation Area

The Effie Variation would have the most impacts on the aesthetics element of the human settlement factor because it would pass by the most residences; however, impacts would be moderated to some extent because it would parallel two existing transmission line corridors for most of its length. The Effie Variation may have more impacts on the archaeological and historic architectural resources factor, as it crosses sections identified as containing known archaeological sites and has the most historic architectural sites within one mile. The Effie Variation would have the most impacts on the water resources element of the natural environment factor because it crosses more water courses, including trout streams.

The Proposed Blue Route and the Proposed Orange Route may have more impact on the wildlife element of the natural environment factor because these alternatives would cross an Important Bird Area. These two alternatives may have the most impact on the federal and state listed species element of the rare and unique natural resources factor because they have the most NHIS records within one mile. These two alternatives also parallel minimal existing corridor, while the Effie Variation parallels existing corridor for most of its length. Because of its longer length, the Effie Variation would cost the most to construct.

The Applicant has indicated that paralleling an existing transmission line corridor (with two existing transmission lines) along the Effie Variation could reduce electric system reliability because three high voltage transmission lines would be in parallel corridors, which may increase vulnerability to simultaneous outages and increase safety risks associated with transmission line maintenance and repair.

Table 6-216 provides an overview of this relative merits assessment for the alternatives in the Effie Variation Area. Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for

each variation area, see the appropriate sections in Chapter 6.

6.4.6.2 East Bear Lake Variation Area

Similar to the Effie Variation, the East Bear Lake Variation in the East Bear Variation would parallel an existing transmission line corridor for just under one-half its length, therefore reducing impacts to the elements of the natural environment factor and the rare communities element of the rare and unique resources factor by avoiding habitat fragmentation, and the MBS Sites of Biodiversity Significance in the Bear Wolf Peatland. Because of its slightly longer length and need for angle structures, the East Bear Lake Variation would be more expensive to construct than the Proposed Orange Route.

The Applicant has indicated that paralleling an existing transmission line corridor (with two existing transmission lines) along the East Bear Lake Variation could reduce electric system reliability because three high voltage transmission lines would be in parallel corridors, which may increase vulnerability to simultaneous outages and increase safety risks associated with transmission line maintenance and repair.

Table 6-217 provides an overview of this relative merits assessment for the alternatives in the East Bear Lake Variation Area. Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

6.4.6.3 Balsam Variation Area

The Proposed Blue Route and Balsam Variation avoid impacts to the aesthetics element of human settlement factor as they are located further from communities in Balsam and Lawrence townships and pass by fewer residences than the Proposed Orange Route. The Proposed Orange Route would cost the most to construct.

The Balsam Variation would have more potential impacts to the mining and mineral resources element of the land-based economies factor as it would cross more active and expired/terminated state mineral lease lands. The Balsam Variation may have more impacts on the archaeological and historic architectural resources factor, as it would cross a section identified as containing known archaeological sites and also has the most historic architectural sites within one mile.

The Proposed Orange Route and the Balsam Variation may have the most impacts on the water resources element of the natural environment factor, as they would cross the most FEMA-designated floodplains, most of which are too large to span.

The Balsam Variation may result in fewer impacts to the **vegetation and wildlife** elements of the natural resource factor as it would be located in an abandoned transmission line corridor for much of its length and may result in fewer impacts associated with new habitat fragmentation than the Proposed Blue Route or Proposed Orange Route.

The Applicant has indicated that corridor sharing along the Proposed Blue Route and Proposed Orange Route may reduce electric system reliability because it would place three high voltage transmission lines parallel along the same corridor, which may increase vulnerability to simultaneous outages and increase safety risks associated with transmission line maintenance and repair.

Table 6-218 provides an overview of this relative merits assessment for the alternatives in the Balsam Variation Area. **Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.**

6.4.6.4 Dead Man's Pond Variation Area

Within the Dead Man's Pond Variation Area, the Dead Man's Pond Variation would create more potential impacts to the aesthetics element of the human settlement factor than the Proposed Blue Route by passing closer to more residences. The Proposed Blue Route may have more impacts on the water resources element of the natural environment factor, as it would cross wetlands too large to span and would cross more shrub wetlands, resulting in more wetland type conversion.

The Proposed Blue Route may result in fewer impacts to the **vegetation and wildlife** elements of the natural resource factor as it parallels a corridor for part of its length and may result in fewer impacts associated with new habitat fragmentation than the Dead Man's Pond Variation. Because it would likely require more angle structures, the Dead Man's Pond Variation would also be more expensive to construct.

Table 6-219 provides an overview of this relative merits assessment for the alternatives in the Dead Man's Pond Variation Area. **Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.**

6.4.6.5 Blackberry Variation Area

In the Blackberry Variation Area, the Proposed Orange Route would result in more impacts to the aesthetics element of the human settlement factor, as it would pass by more residences. In addition, the Proposed Orange Route is a slightly longer route and would likely require more angle structures than the Proposed Blue Route, so it would cost more to construct.

The Proposed Blue Route may have more impact on the archaeological and historic resources factor, as it has more historic architectural sites located within one mile than that the Proposed Orange Route.

While both alternatives parallel existing transmission line corridor, the Proposed Orange Route parallels more corridor than the Proposed Blue Route. The Applicant has indicated that corridor sharing along the Proposed Blue Route and Proposed Orange Route could reduce electric system reliability because three high voltage transmission lines would be in parallel corridors, which may increase vulnerability to simultaneous outages and increase safety risks associated with transmission line maintenance and repair.

Table 6-220 provides an overview of this relative merits assessment for the alternatives in the Blackberry Variation Area. **Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.**

Table 6-216 Relative Merits Assessment for the Effie Variation Area

Relative Merits ⁽¹⁾		Effie Variation Area			
Factor	Element	Proposed Blue Route	Proposed Orange Route	Effie Variation	Notes
Human settlement	Aesthetics				Effie Variation would pass by the most residences within 1,500 feet of the anticipated alignment.
	Land use compatibility				There are no land use compatibility issues identified for the alternatives. All alternatives cross a relatively similar amount of private land.
Land-Based economies	Agriculture				All alternatives would cross a relatively similar amount of farmland. Effie Variation parallels an existing transmission line corridor for 80% of its length. The other alternatives parallel minimal existing corridor.
	Forestry				All alternatives would cross a relatively similar amount of state forest land. Effie Variation parallels an existing transmission line corridor for 80% of its length. The other alternatives parallel minimal existing corridor.
	Mining and mineral resources				All alternatives would cross a relatively similar amount of active and expired/terminated mineral lease lands.
Archaeological and historic architectural resources					Effie Variation would cross sections identified as containing known archaeological sites, while the other alternatives would not. The Effie Variation has more historic architectural sites within 1 mile than the Proposed Blue Route and Proposed Orange Route.
Natural environment	Water resources				Effie Variation would cross the most watercourses/ waterbodies; including six trout streams. All crossings are expected to be spanned, although clearing vegetation adjacent to trout streams could result in increased water temperature, potentially resulting in less suitable trout habitat. Proposed Blue Route and the Proposed Orange Route would cross FEMA-designated floodplains; however the areas are small and would be spanned. All alternatives would cross relatively similar areas of wetlands that are too large to span and would result in relatively similar areas of shrub and forested wetland type conversion.
	Vegetation				All alternatives would cross a relatively similar amount of forested land cover. Effie Variation parallels an existing transmission line corridor for 80% of its length. The other alternatives parallel minimal existing corridor.
	Wildlife				Proposed Blue Route and Proposed Orange Route would cross the important Bird Area.
Rare and unique natural resources	Federal and state-listed species				The alternatives cross critical habitat designated for gray wolf. Proposed Orange Route has the most NHIS records within 1 mile. Proposed Blue Route has more NHIS records than the Effie Variation. Effie Variation would also minimize impacts by paralleling existing corridor.
	State rare communities				All alternatives would cross a relatively similar amount of MBS Sites of Biodiversity Significance.
Paralleling of existing ROWs					Proposed Blue Route and Proposed Orange Route would cross the Important Bird Area.
Electrical system reliability					Effie Variation would parallel existing 500 kV and 230 kV transmission line corridors for the entire length.
Costs of constructing, operating, and maintaining the facility which are dependent on design and route					The cost for the Proposed Orange Route is within 20% of the cost of the Proposed Blue Route. The cost of the Effie Variation is more than 20% above the cost of the Proposed Blue Route.

(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

Table 6-217 Relative Merits Assessment for the East Bear Lake Variation Area

Relative Merits ⁽¹⁾		East Bear Lake Variation Area		
Factor	Element	Proposed Blue Route	Proposed Orange Route	Notes
Human settlement	Aesthetics			No residences are present within 1,500 feet of the anticipated alignment for either alternative.
	Land use compatibility			There are no land use compatibility issues identified for the alternatives. Neither alternative would cross private land.
Land-Based economies	Agriculture			Both alternatives would cross a relatively similar amount of farmland. East Bear Lake Variation would parallel existing corridors for nearly half of its length.
	Forestry			Both alternatives would cross a relatively similar amount of state forest land. East Bear Lake Variation would parallel existing corridors for nearly half of its length.
	Mining and mineral resources			Both alternatives would cross a relatively similar amount of active and expired/terminated mineral lease lands. East Bear Lake Variation would parallel existing corridors for nearly half of its length.
Archaeological and historic architectural resources				There are no known archaeological and historic architectural resources that would be affected by the alternatives.
Natural environment	Water resources			Both alternatives would cross relatively similar numbers of watercourses/waterbodies; however, all crossings are expected to be spanned. Neither alternative would cross floodplains. Both alternatives would cross relatively similar areas of wetlands that are too large to span and would result in relatively similar areas of shrub and forested wetland type conversion.
	Vegetation			Both alternatives would cross a relatively similar amount of forested land cover. East Bear Lake Variation would parallel existing corridors for nearly half of its length.
	Wildlife			Neither alternative would cross designated wildlife resources.
Rare and unique natural resources	Federal and state-listed species			There are no federally listed species identified for these alternatives. All alternatives would have a relatively similar number of NHIS records within 1 mile. Neither alternative has threatened or endangered NHIS records within 1 mile.
	State rare communities			Both alternatives would cross a relatively similar amount of MBS Sites of Biodiversity Significance.
Paralleling of existing ROWs				East Bear Lake Variation would parallel existing transmission line, roadway, and/or trail corridor, while the Proposed Orange Route would not parallel these corridors.
Electrical system reliability				East Bear Lake Variation would parallel existing 500 kV and 230 kV transmission line corridors for 42% of its length.
Costs of constructing, operating, and maintaining the facility which are dependent on design and route				The cost of the East Bear Lake Variation is more than 20% above the cost of the Proposed Orange Route.

(1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.

(2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

Table 6-21, Relative Merits Assessment for the Balsam Variation Area

Relative Merits ⁽¹⁾		Balsam Variation Area			
Factor	Element	Proposed Blue Route	Proposed Orange Route	Balsam Variation	Notes
Human settlement	Aesthetics				Proposed Orange Route would pass by the most residences within 1,500 feet of the anticipated alignment.
	Land use compatibility				There are no land use compatibility issues identified for the alternatives. All alternatives would cross a relatively similar amount of private land.
Land-Based economies	Agriculture				All alternatives cross a relatively similar amount of farmland.
	Forestry				None of the alternatives cross state forest land.
	Mining and mineral resources				Balsam Variation would cross active and expired/terminated mineral lease lands while the proposed routes would not cross any mineral lease lands.
Archaeological and historic architectural resources					Balsam Variation would cross a section identified as containing known archaeological sites, while the other alternatives would not. Balsam Variation has the most historic architectural sites within 1 mile.
Natural environment	Water resources				All alternatives would cross relatively similar numbers of watercourses/waterbodies; however, all crossings are expected to be spanned. All alternatives would cross FEMA-designated floodplains large enough that they cannot be spanned; Proposed Orange Route would cross the most floodplain. All alternatives would cross relatively similar areas of wetlands that are too large to span and would result in relatively similar areas of shrub and forested wetland type conversion.
	Vegetation				All alternatives would cross a relatively similar amount of forested land cover. Balsam Variation parallels existing transmission line, roadway, or field corridor for a greater proportion of its length than the proposed routes.
	Wildlife				None of the alternatives would cross designated wildlife resources.
Rare and unique natural resources	Federal and state-listed species				There are no federally listed species identified for these alternatives. The alternatives have the same number of NHIS records within 1 mile, none of which are threatened or endangered species.
	State rare communities				All alternatives would cross a relatively similar amount of MBS Sites of Biodiversity Significance.
Paralleling of existing ROWs					All alternatives would parallel existing transmission line, roadway, and/or trail corridor. Balsam Variation would be located in an abandoned transmission line corridor for 66% of its length.
Electrical system reliability					Proposed Blue Route and Proposed Orange Route would parallel two existing 115 kV transmission line corridors for 15% of their lengths.
Costs of constructing, operating, and maintaining the facility which are dependent on design and route					The cost for the Proposed Orange Route is within 20% of the cost of the Proposed Blue Route. The cost of the Balsam Variation is more than 20% above the cost of the Proposed Blue Route.

- (1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.
- (2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

Table 6-219 Relative Merits Assessment for the Dead Man's Pond Variation Area

Relative Merits ⁽¹⁾		Dead Man's Pond Variation Area		
Factor	Element	Proposed Blue Route	Dead Man's Pond Variation	Notes
Human settlement	Aesthetics			Dead Man's Pond Variation would pass by more residences within 1,500 feet of the anticipated alignment.
	Land use compatibility			There are no land use compatibility issues identified for the alternatives. Both alternatives would cross a relatively similar amount of private land.
Land-Based economies	Agriculture			Both alternatives would cross a relatively similar amount of farmland.
	Forestry			Neither alternative would cross state forest land.
	Mining and mineral resources			No active or expired/terminated mineral lease lands or aggregate resources are present in the ROW of any alternative.
Archaeological and historic architectural resources				There are no known archaeological sites that would be affected by the alternatives. Both alternatives have one historic architectural site within 1 mile.
Natural environment	Water resources			There would be no differences between the alternatives for crossing watercourses, waterbodies, and floodplains. Proposed Blue Route would cross wetlands that are too large to span, while Dead Man's Pond Variation would be able to span wetlands. Both alternatives would result in relatively similar areas of forested wetland type conversion. Proposed Blue Route would have the most shrub wetland; therefore, would require the most shrub wetland type conversion.
	Vegetation			Both alternatives would cross a relatively similar amount of forested land cover.
	Wildlife			Neither alternative would cross designated wildlife resources.
Rare and unique natural resources	Federal and state-listed species			There are no federally listed species identified for these alternatives. There is 1 threatened NHIS record within 1 mile of the Dead Man's Pond Variation. However, this species is a fish and because it is anticipated that all waterbodies and watercourses would be spanned, impacts to this aquatic species are not expected.
	State rare communities			No known rare and unique natural resources were identified for the alternatives.
Paralleling of existing ROWs				Proposed Blue Route parallels some existing transmission line, roadway, and/or trail corridor, while the Dead Man's Pond Variation does not parallel any of these existing corridors.
Electrical system reliability				There are no issues with electrical reliability since there would not be three transmission lines paralleling the same corridor.
Costs of constructing, operating, and maintaining the facility which are dependent on design and route				The cost of the Dead Man's Pond Variation is more than 20% above the cost of the Proposed Blue Route.

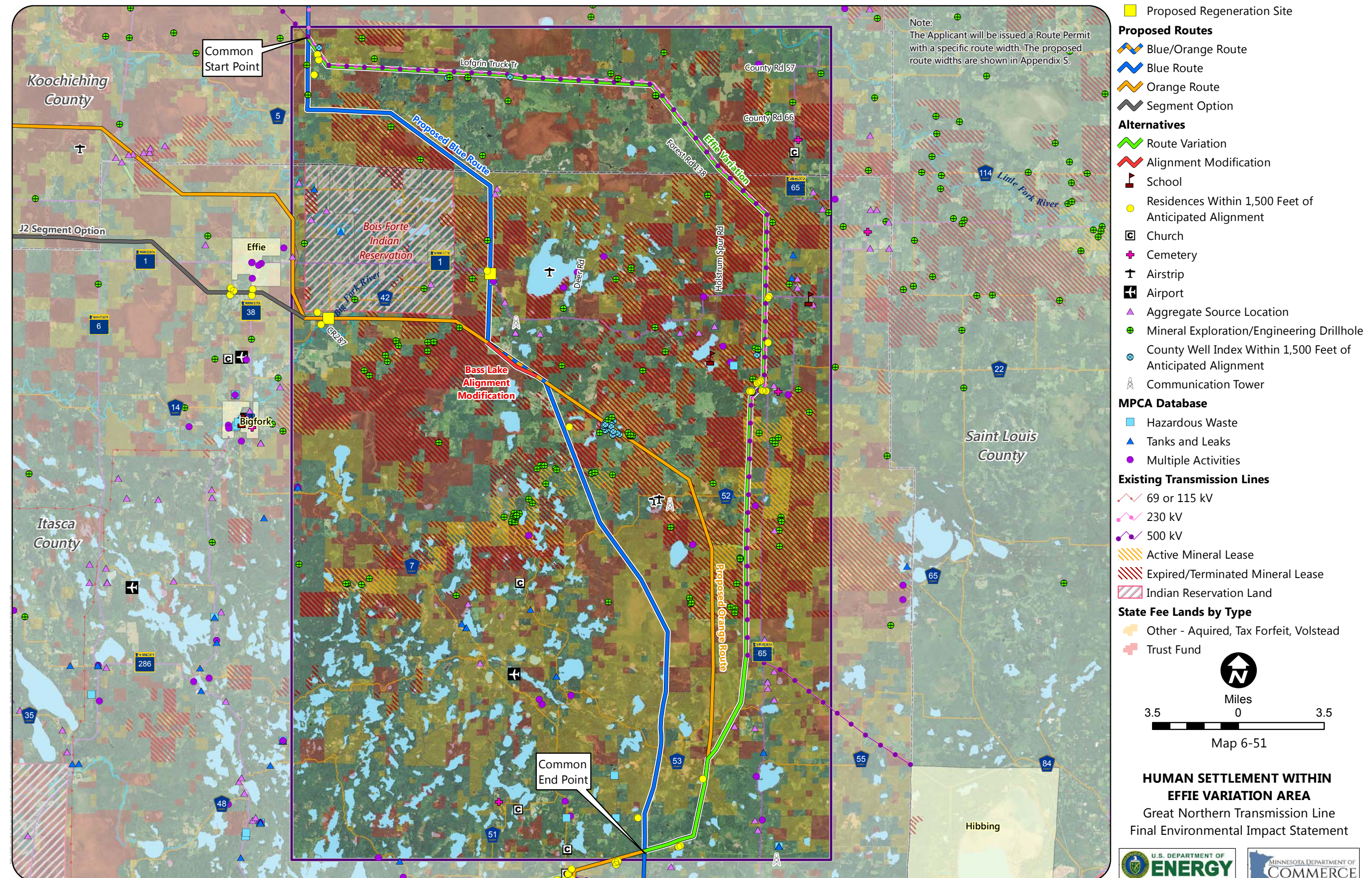
- (1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.
- (2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

Table 6-220 Relative Merits Assessment for the Blackberry Variation Area

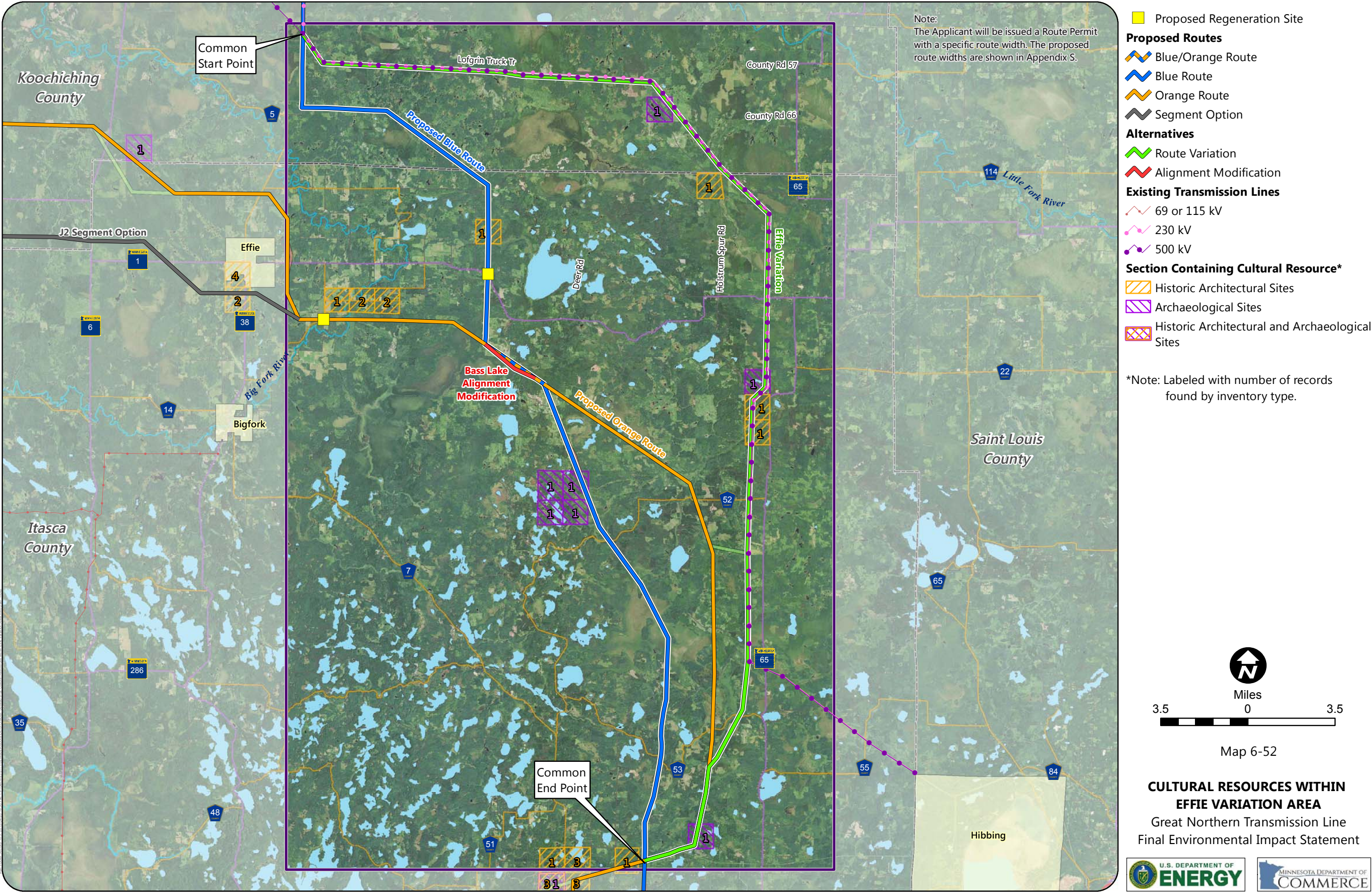
Relative Merits ⁽¹⁾		Blackberry Variation Area		
Factor	Element	Proposed Blue Route	Proposed Orange Route	Notes
Human settlement	Aesthetics			Proposed Orange Route would pass by more residences within 1,500 feet of the anticipated alignment.
	Land use compatibility			There are no land use compatibility issues identified for the alternatives. Both alternatives would cross a relatively similar amount of private land.
Land-Based economies	Agriculture			Both alternatives would cross a relatively similar amount of farmland.
	Forestry			Neither alternative would cross state forest land.
	Mining and mineral resources			Proximity to expired/terminated mineral lease lands are relatively similar between the alternatives.
Archaeological and historic architectural resources				There are no known archaeological resources that would be affected by the alternatives. Proposed Blue Route has more historic architectural sites within 1 mile.
Natural environment	Water resources			Proposed Orange Route would cross the most watercourses/ waterbodies; however, all crossings are expected to be spanned. There would be no differences between the alternatives for crossing floodplains. Both alternatives would cross relatively similar areas of wetlands that are too large to span and would result in relatively similar areas of forested wetland type conversion. Proposed Blue Route would have the most shrub wetland; therefore, would require the most shrub wetland type conversion.
	Vegetation			Both alternatives would cross a relatively similar amount of forested land cover. Proposed Orange Route parallels more existing transmission line corridor.
	Wildlife			Neither alternative would cross designated wildlife resources.
Rare and unique natural resources	Federal and state-listed species			There are no federally listed species identified for these alternatives. Both alternatives have a relatively similar number of NHIS records, including threatened or endangered NHIS records, within 1 mile.
	State rare communities			Both alternatives would cross a relatively similar amount of MBS Sites of Biodiversity Significance.
Paralleling of existing ROWs				Both alternatives would parallel a relatively similar amount of transmission line, roadway, and/or trail corridor.
Electrical system reliability				Both alternatives would parallel 2 existing high voltage transmission lines for a relatively similar proportion of their length.
Costs of constructing, operating, and maintaining the facility which are dependent on design and route				The cost of the Proposed Orange Route is more than 20% above the cost of the Proposed Blue Route.

- (1) Colors represent least impacts (green), moderate impacts (yellow), greatest impacts (red), and no impacts/similar impacts (gray) relative to the specific Factor.
- (2) Appendix X provides the underlying data used in the color graphic determination for each alternative in each variation area. For the most comprehensive information on the comparative environmental consequences for each variation area, see the appropriate sections in Chapter 6.

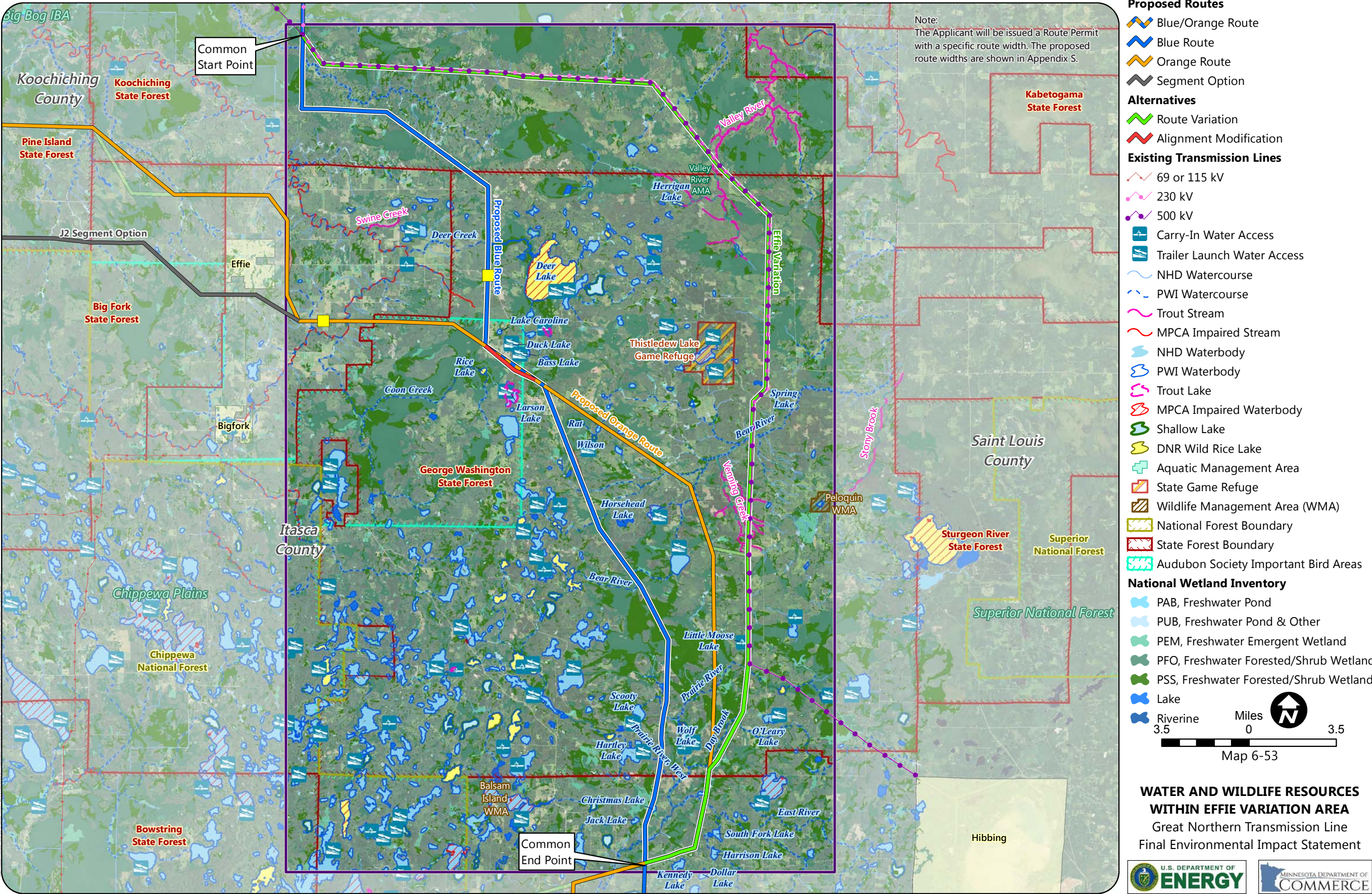
Map 6-51 Human Settlement within Effie Variation Area



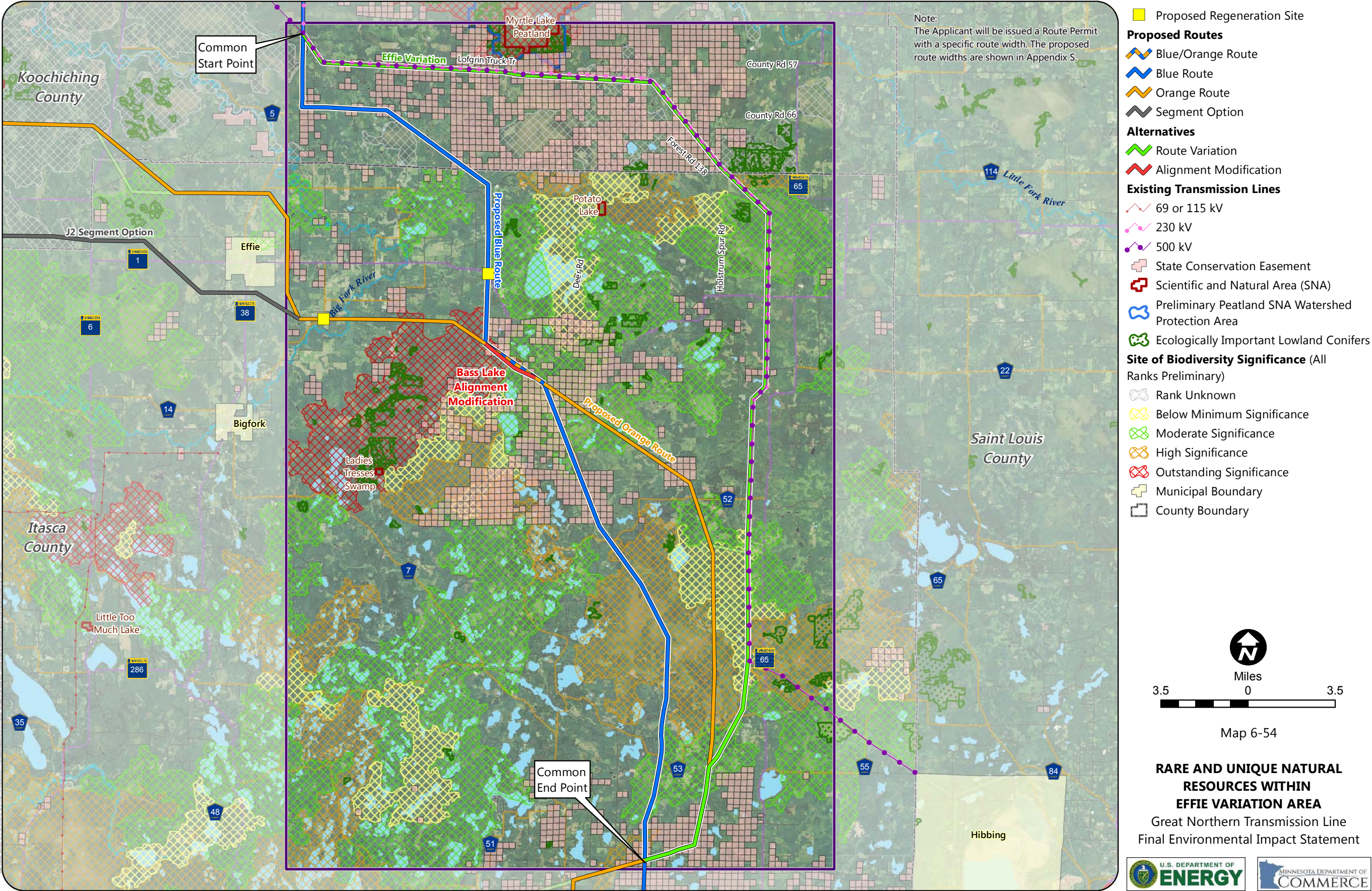
Map 6-52 Cultural Resources within Effie Variation Area



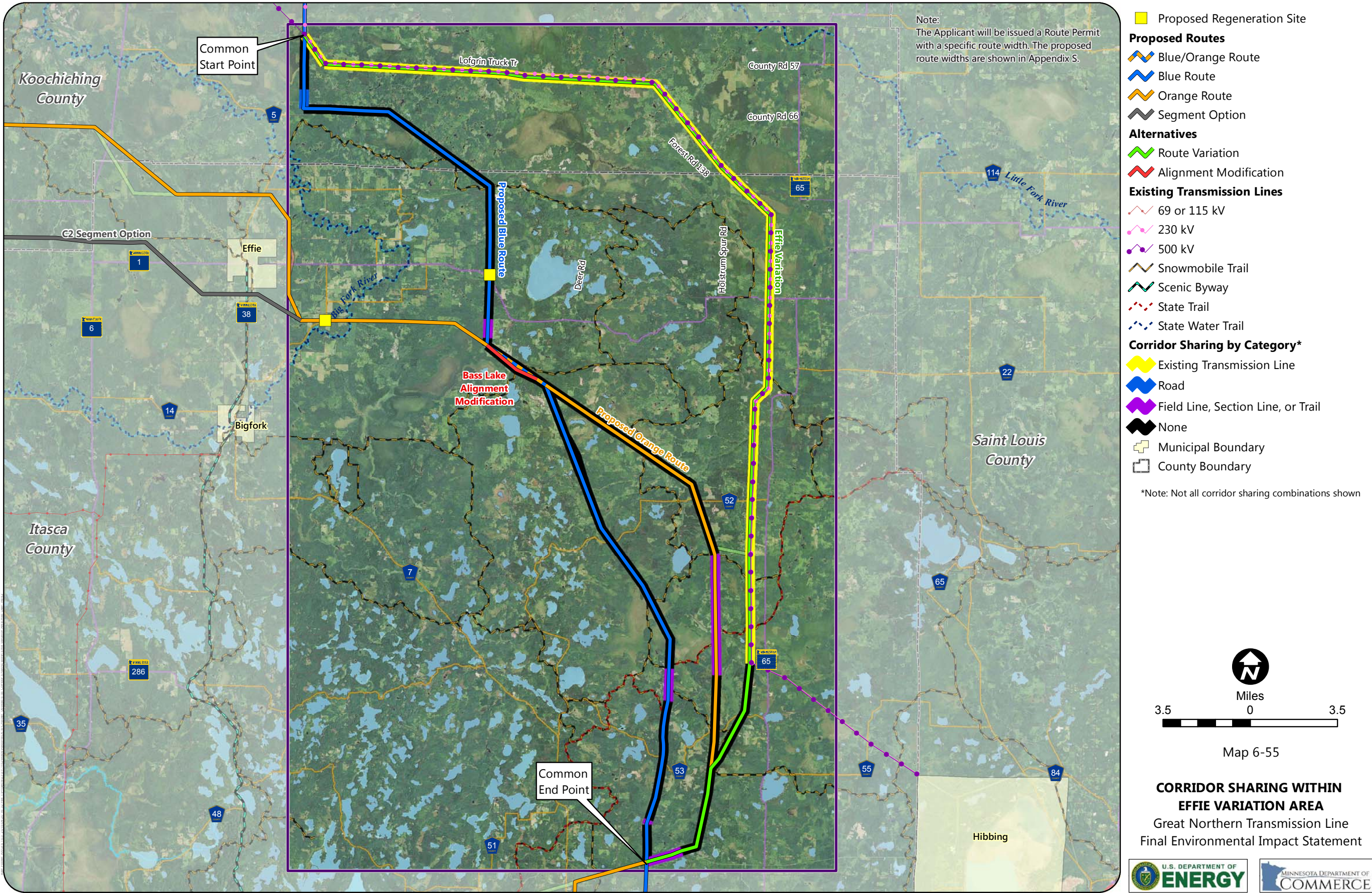
Map 6-53 Water and Wildlife Resources within Effie Variation Area



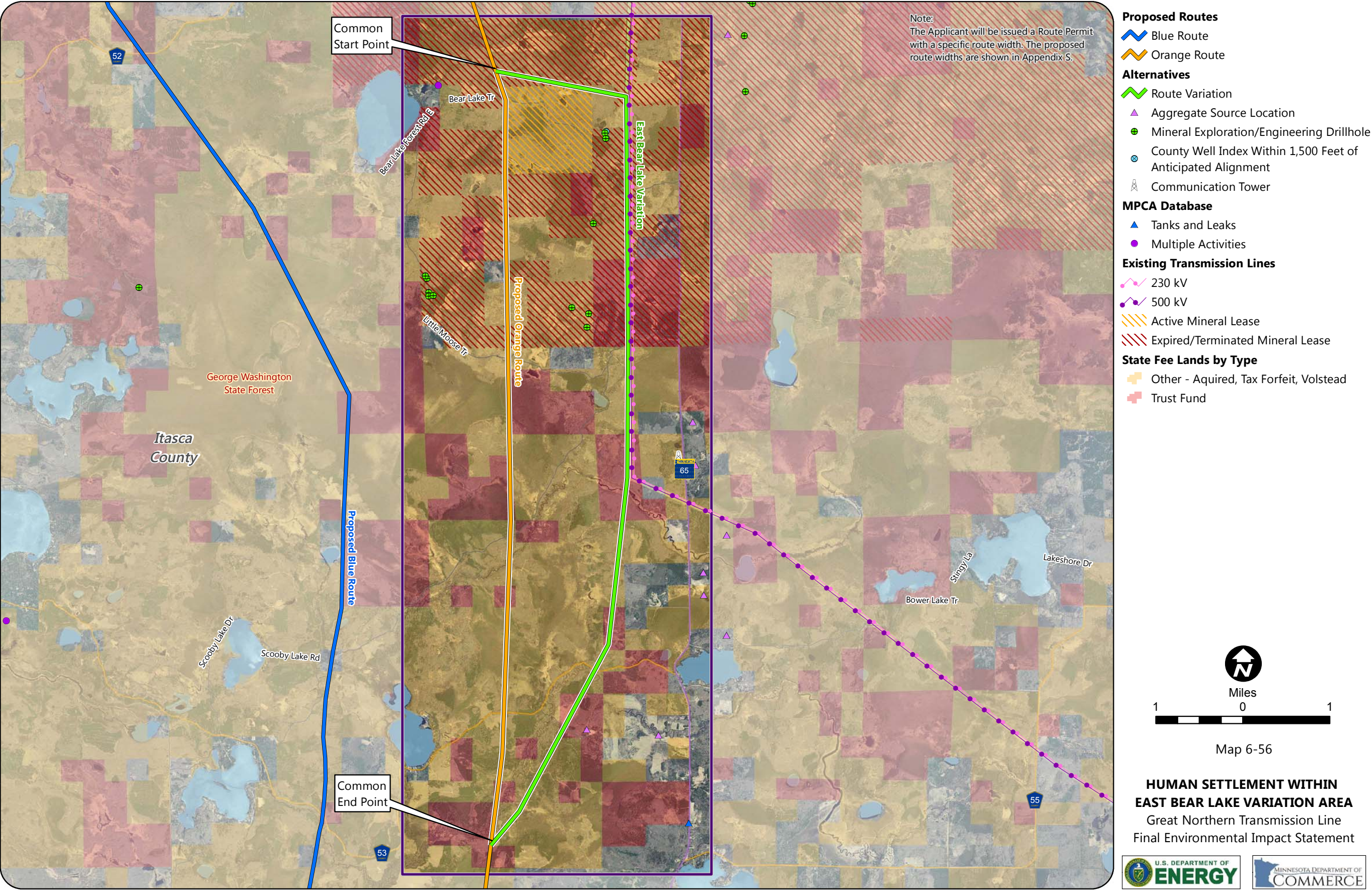
Map 6-54 Rare and Unique Natural Resources within Effie Variation Area



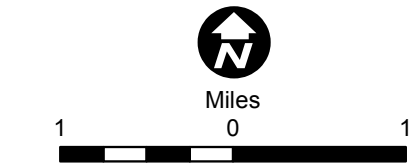
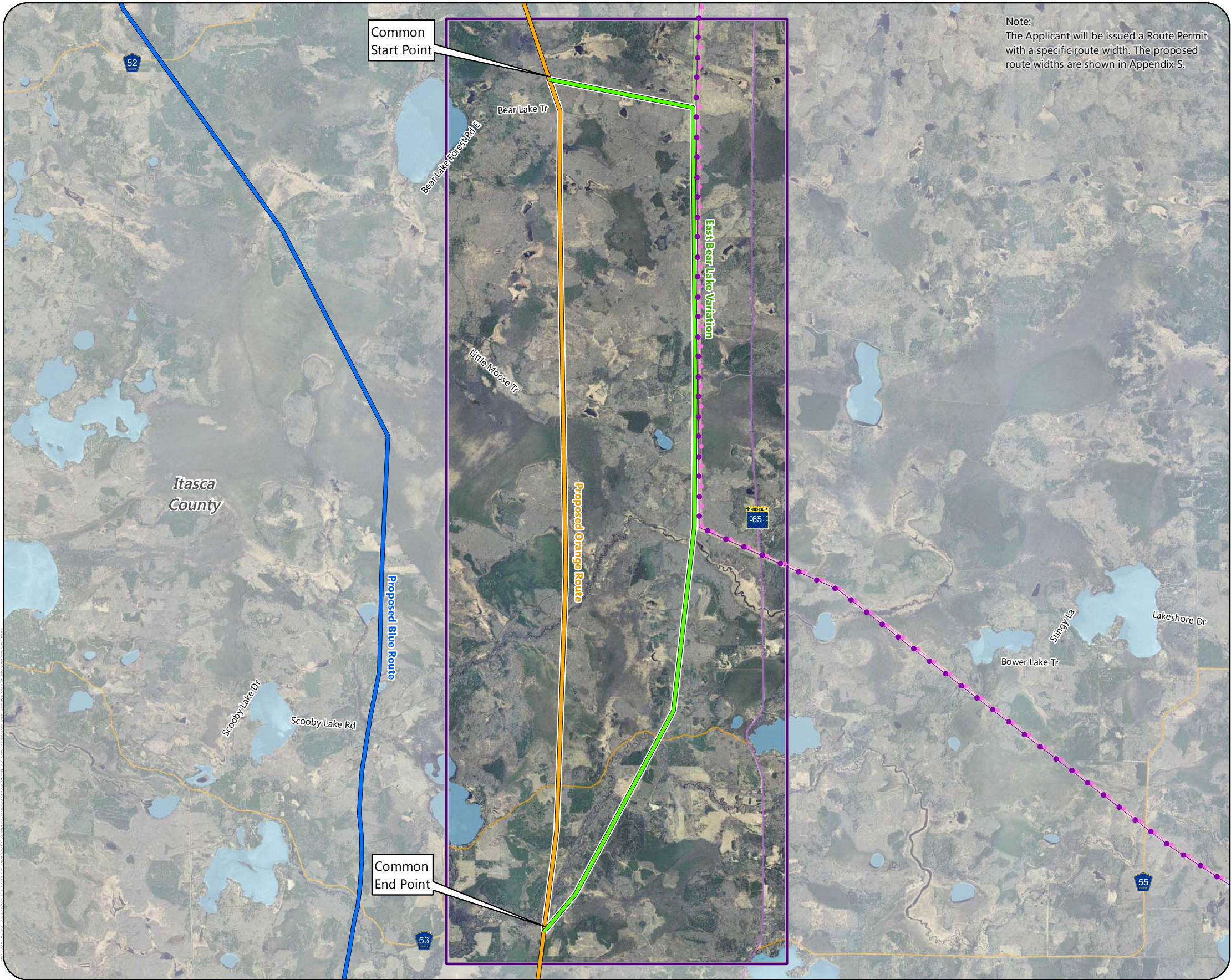
Map 6-55 Corridor Sharing within Effie Variation Area



Map 6-56 Human Settlement within East Bear Lake Variation Area



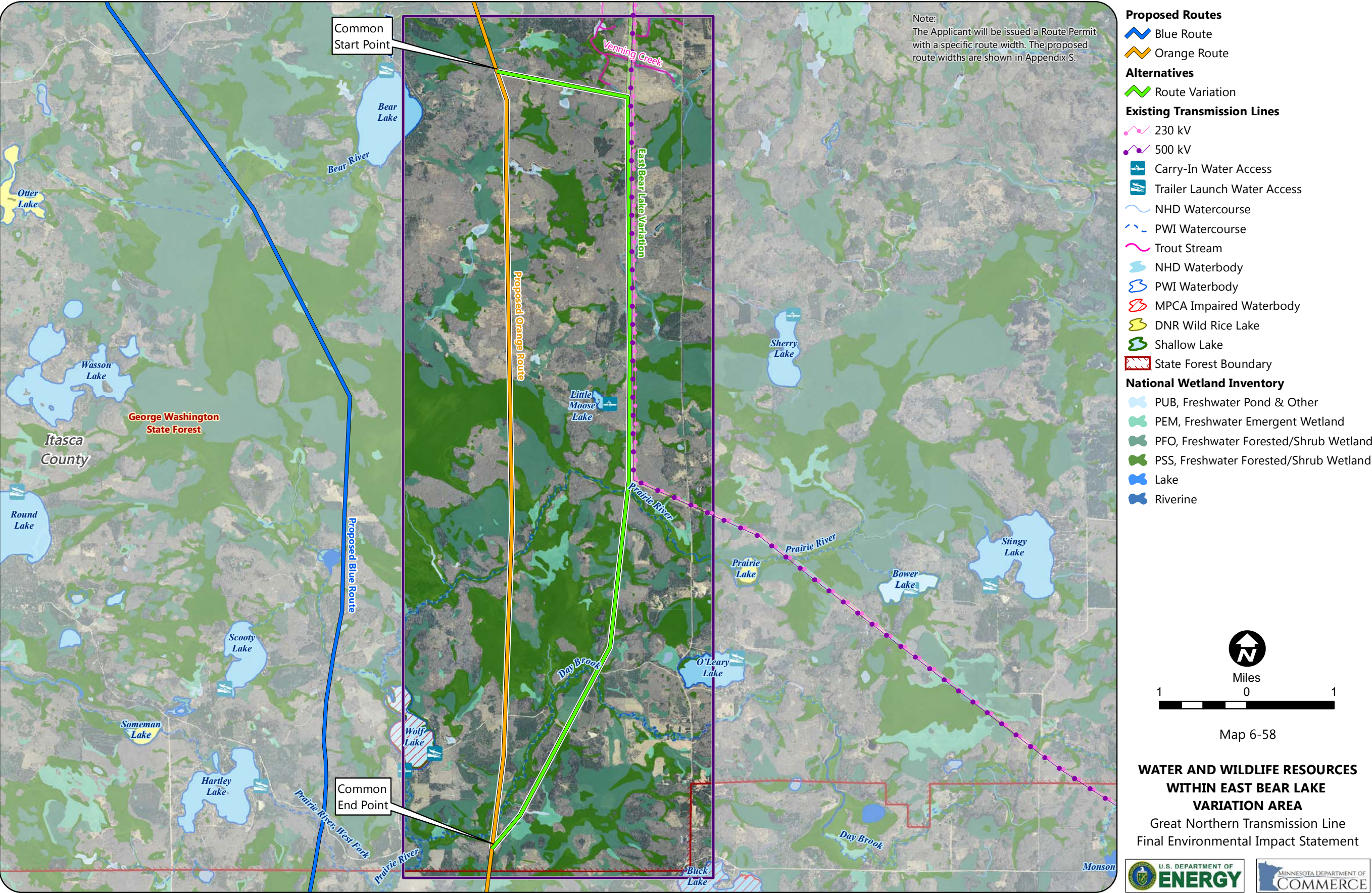
Map 6-57 Cultural Resources within East Bear Lake Variation Area



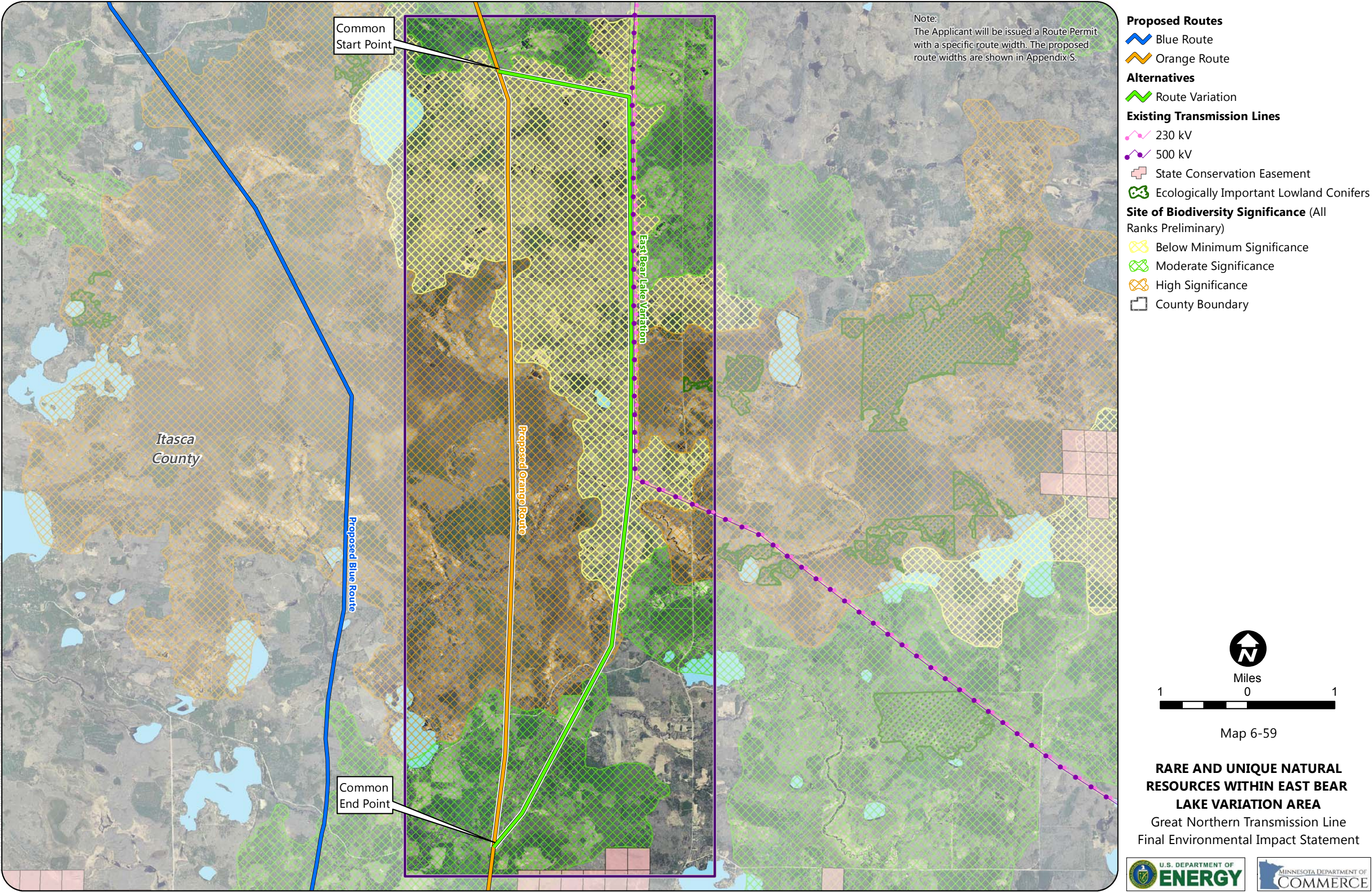
Map 6-57

CULTURAL RESOURCES WITHIN EAST BEAR LAKE VARIATION AREA
Great Northern Transmission Line
Final Environmental Impact Statement

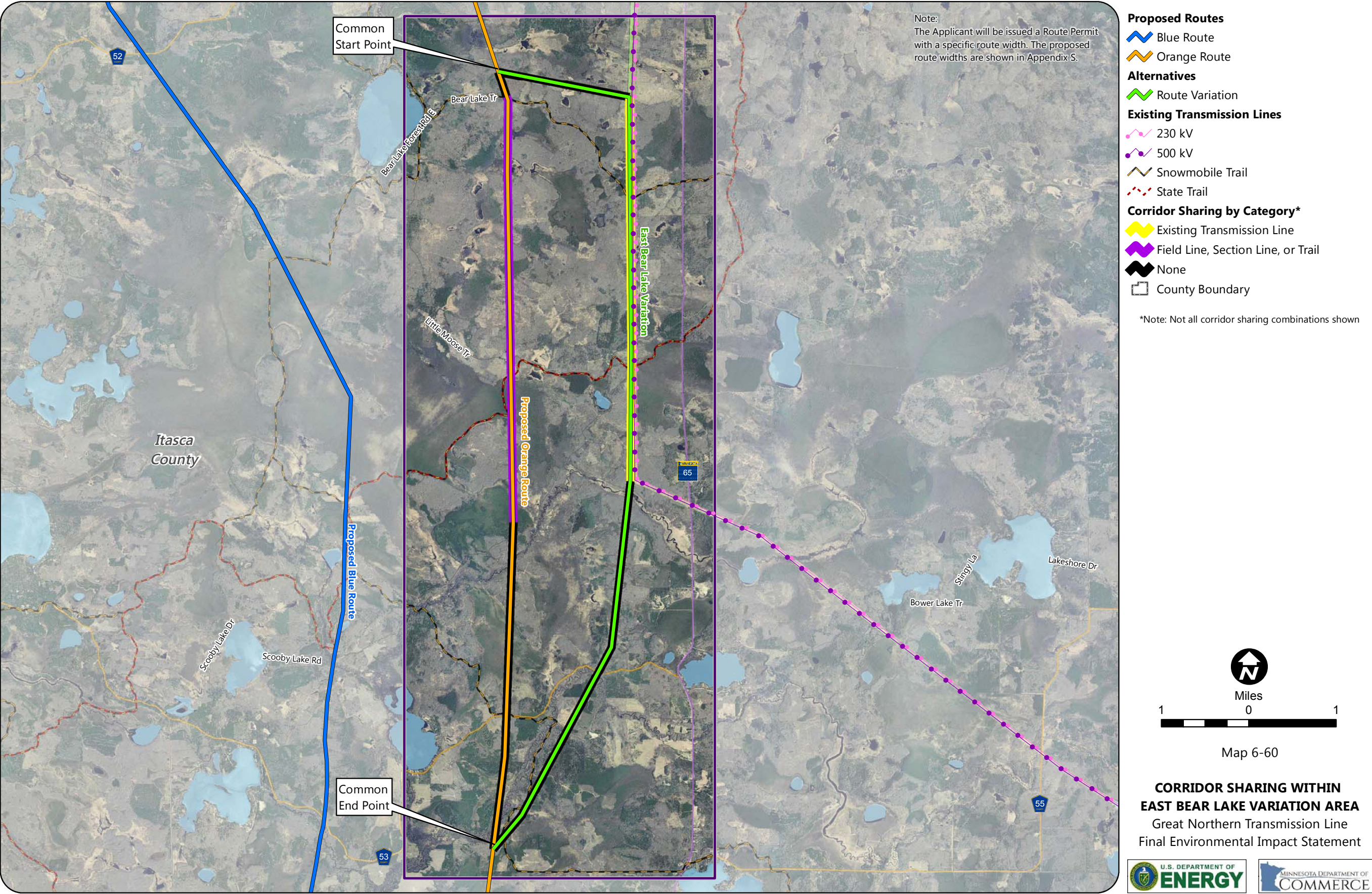
Map 6-58 Water and Wildlife Resources within East Bear Lake Variation Area



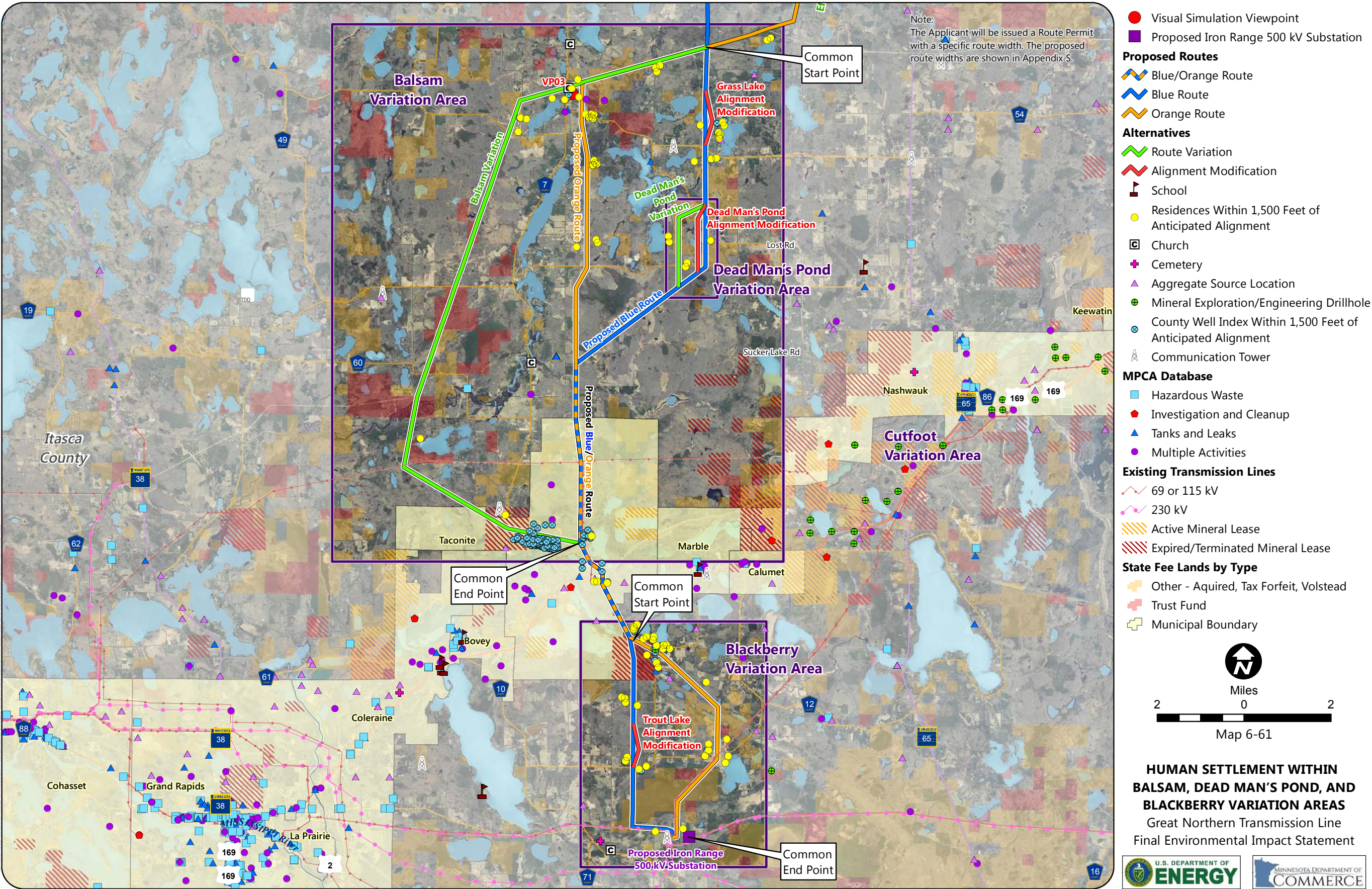
Map 6-59 Rare and Unique Natural Resources within East Bear Lake Variation Area



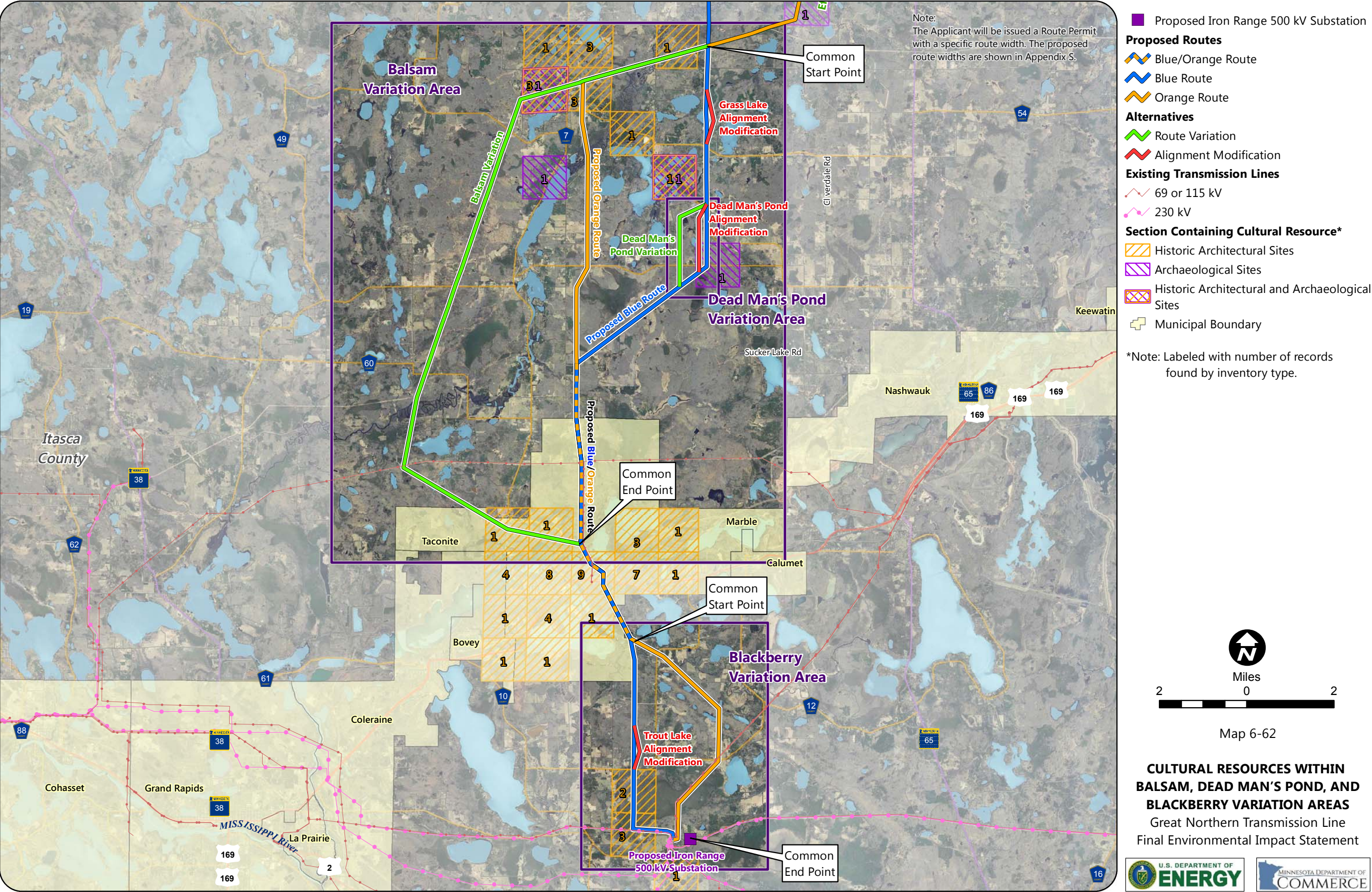
Map 6-60 Corridor Sharing within East Bear Lake Variation Area



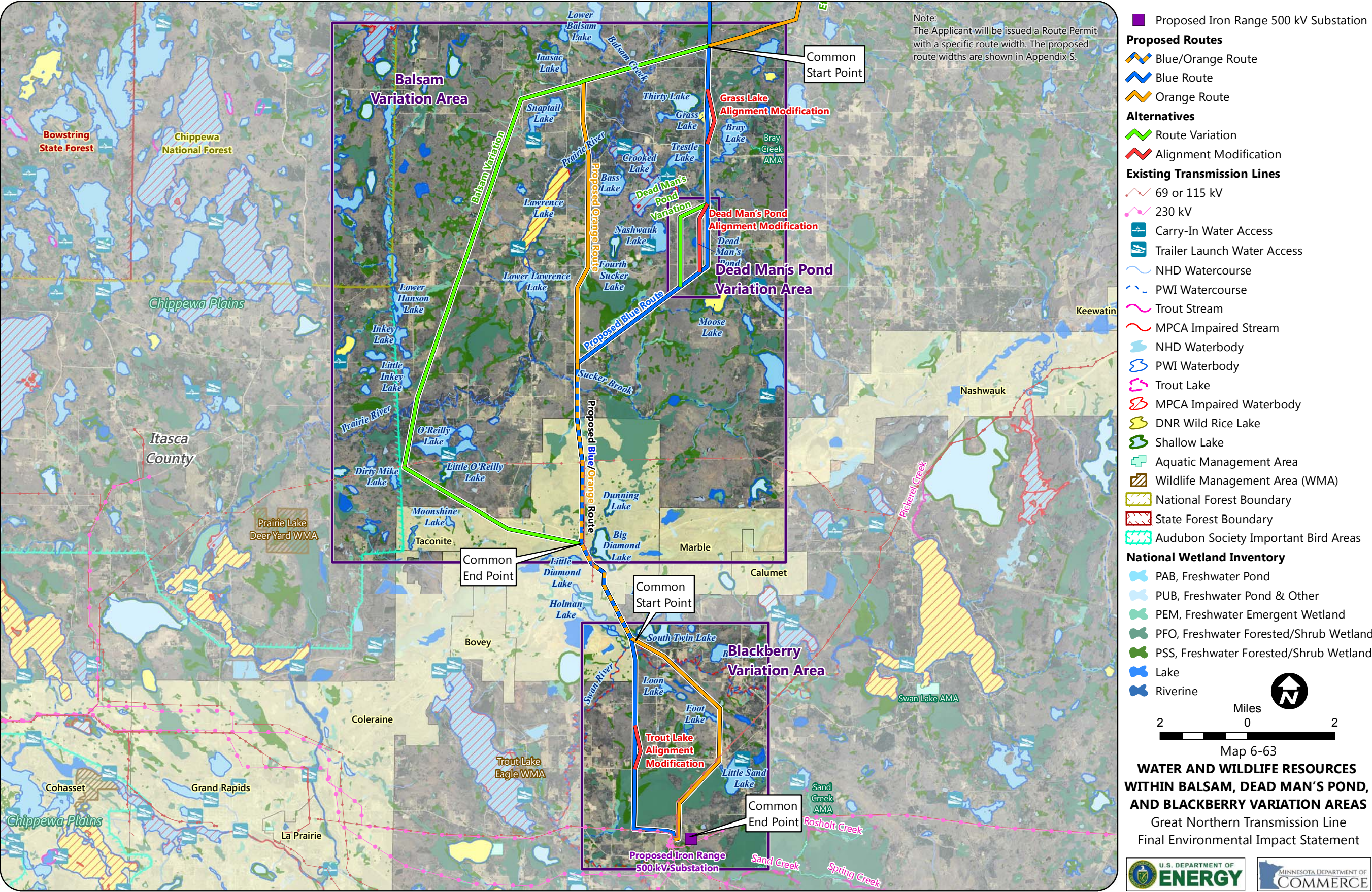
Map 6-61 Human Settlement within Balsam, Dead Man's Pond, and Blackberry Variation Areas



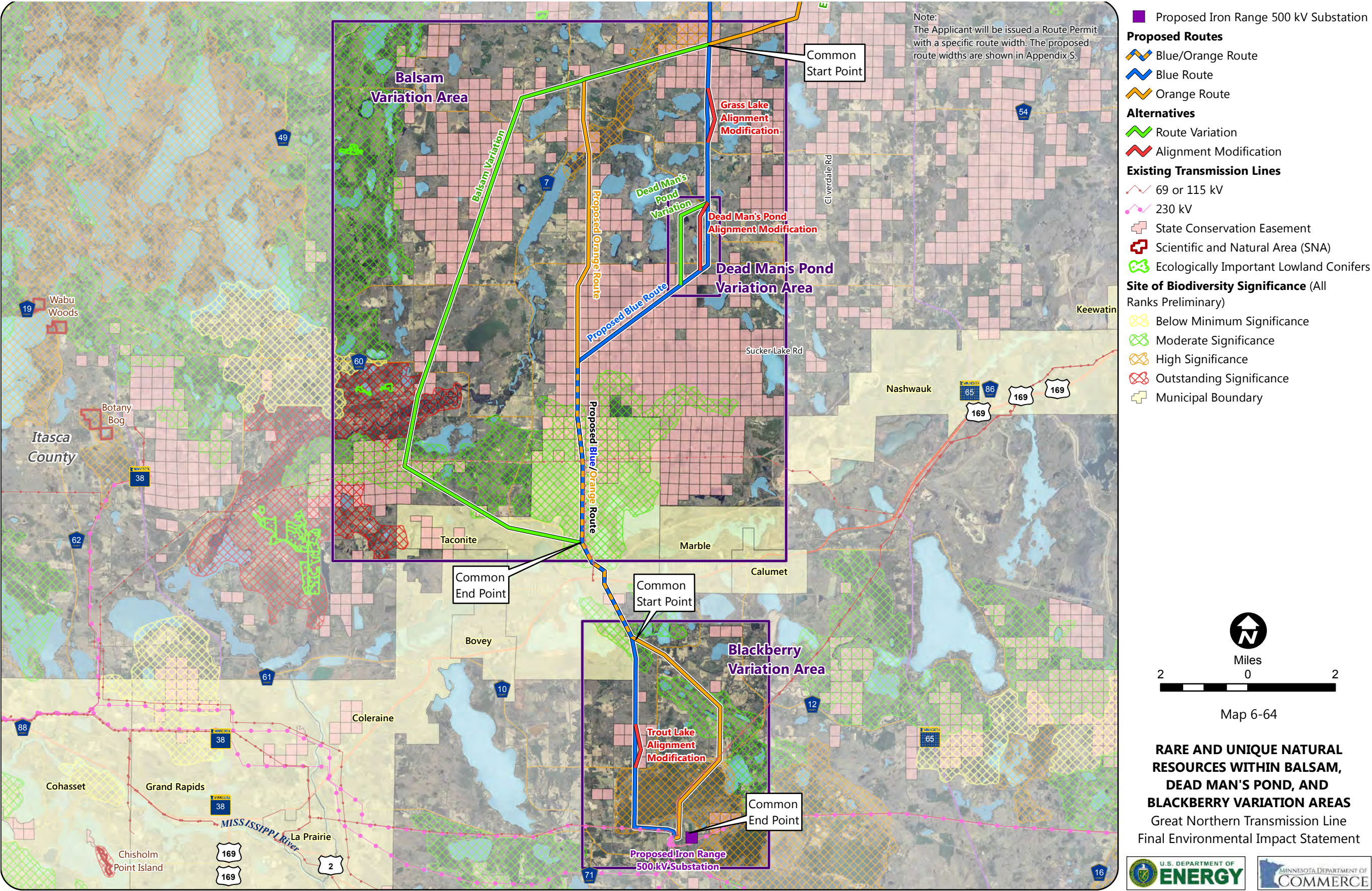
Map 6-62 Cultural Resources within Balsam, Dead Man's Pond, and Blackberry Variation Areas



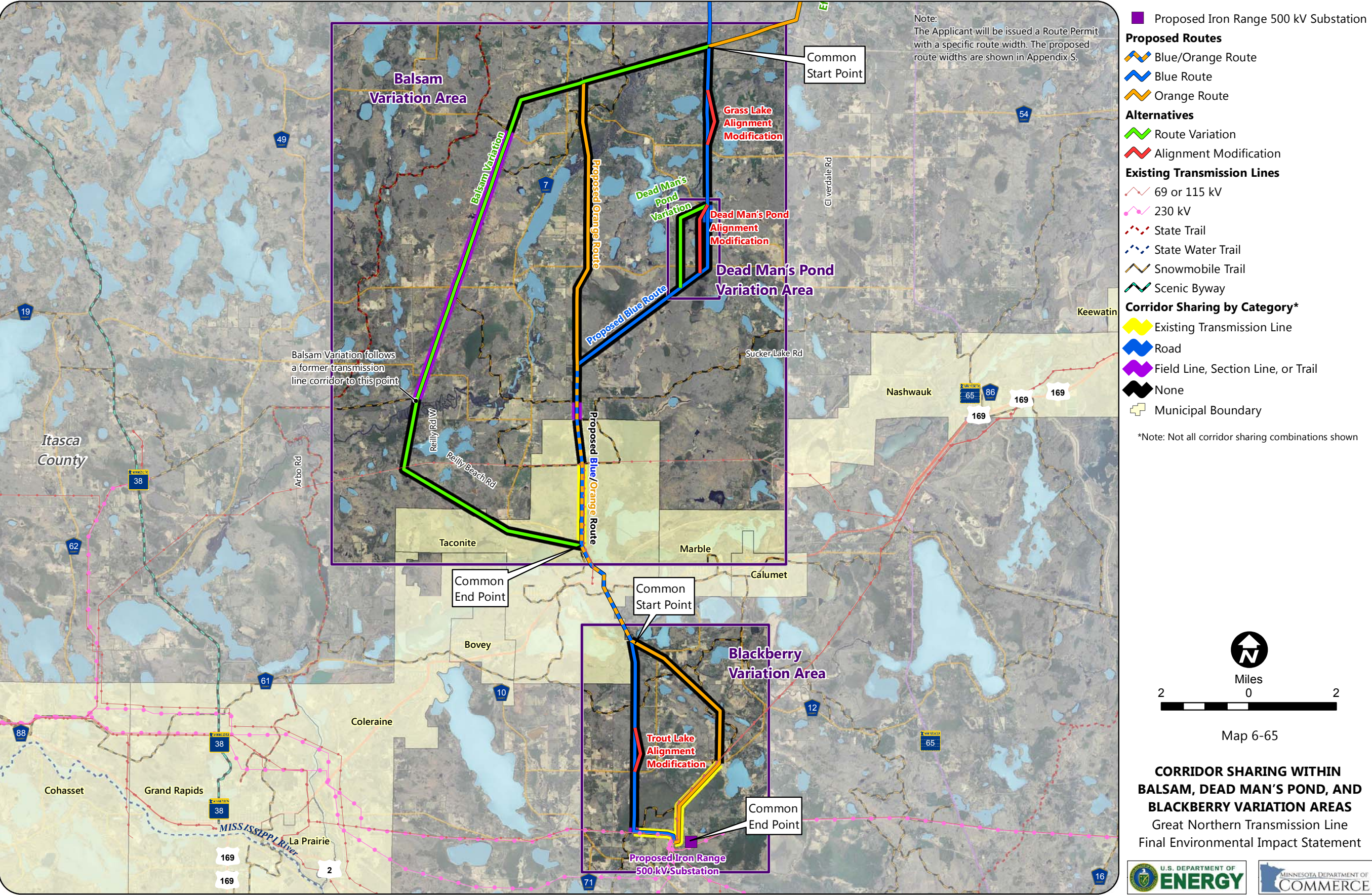
Map 6-63 Water and Wildlife Resources within Balsam, Dead Man's Pond, and Blackberry Variation Areas



Map 6-64 Rare and Unique Natural Resources within Balsam, Dead Man's Pond, and Blackberry Variation Areas



Map 6-65 Corridor Sharing within Balsam, Dead Man's Pond, and Blackberry Variation Areas



This page left blank intentionally

6.5 Alignment Modifications

Minor adjustments to the proposed anticipated alignment within a given route or route alternative (i.e., alignment modifications), were proposed during the scoping period as described in Section 4.3. The purpose for each alignment modification is to avoid a specific issue raised by the commenters (e.g., sensitive lands, houses, following existing corridors). In the sections that follow, only the issues that differ between the proposed route and the alignment modification are described. Specific alignment modifications may be incorporated in the MN PUC Route Permit as a special condition should the MN PUC find they are warranted. Details for all the alignment modifications are provided in Appendix E.

6.5.1 West Section

There are no alignment modifications identified in the West Section.

6.5.2 Central Section

There are four alignment modifications proposed for the Central Section: Silver Creek WMA, Airstrip, Mizpah, and Gravel Pit (Map 4-8). These alignment modifications are described below in sections 6.5.2.1 through 6.5.2.4.

6.5.2.1 Silver Creek WMA Alignment Modification

The Silver Creek WMA Alignment Modification is located in the north-central portion of the Pine Island Variation Area (Map 4-9). The alignment modification is the same length as the comparable segment of the Proposed Blue Route (Table 4-4, Map 6-66). The Proposed Blue Route follows the south side of the existing 230 kV transmission line, which parallels the southern edge of the USFWS Interest Lands and the Silver Creek WMA. Land ownership includes private, state forest, and federal lands.

The Silver Creek WMA Alignment Modification shifts the anticipated alignment approximately 150 feet south onto state forest land and avoids impacts to federal land and the Silver Creek WMA. The alignment modification does not parallel an existing corridor like the Proposed Blue Route so would require creation of new corridor for its entire length (Map 6-66). Because of this, the alignment modification would result in more fragmentation of intact state forest.

6.5.2.2 Airstrip Alignment Modification

The Airstrip Alignment Modification is located in the east portion of the C2 Segment Option Variation Area (Map 4-12). This alignment modification is the same length as the comparable segment of the Proposed C2 Segment Option Route (Table 4-4, Map 6-67). The Proposed C2 Segment Option Route follows the west side of the existing 230 kV transmission line for over half of its length. Land ownership includes private, corporate, county-administered state, and state trust lands.

The Airstrip Alignment Modification shifts the anticipated alignment approximately 725 feet west to avoid impacts to the private airstrip located east of the existing 230 kV transmission line. The height of the proposed transmission line would be taller than the existing 230 kV transmission line and located northwest of the north end of the airstrip, so use of the airstrip may be affected since it has a northwest/southeast orientation. This alignment modification would be located approximately 1,000 feet west of the existing 230 kV transmission line so would provide additional distance for use of the airstrip (Map 6-67). Land ownership remains the same mix of private and state lands as described for the Proposed C2 Segment Option Route.

6.5.2.3 Mizpah Alignment Modification

The Mizpah Alignment Modification is located in the northwest portion of the J2 Segment Option Variation Area (Map 4-13). This alignment modification is the same length as the comparable segment of the Proposed Orange Route (Table 4-4, Map 6-68). Land ownership includes both private, county-administered state, and state forest lands.

The Mizpah Alignment Modification shifts the anticipated alignment north from a mix of private and state lands onto only state lands. Both the Proposed Orange Route and this alignment modification would require creation of new corridor for their entire length (Map 6-68). Because of this, both options would result in fragmentation of intact forest.

6.5.2.4 Gravel Pit Alignment Modification

The Gravel Pit Alignment Modification is located in the southeast portion of the J2 Variation Area (Map 4-13). This alignment modification is the same length as the comparable segment of the Proposed Orange Route (Table 4-4, Map 6-69). The Proposed Orange Route includes an existing private gravel pit and the existing Effie dump (MPCA State Assessment Site SA7836) within 100 feet of the west edge of the ROW (Map 6-69). Land ownership

includes private, corporate, county-administered state, and state fee lands.

The Gravel Pit Alignment Modification shifts the anticipated alignment approximately 750 feet east to avoid impacts to the private gravel pit and no privately-owned land would be located within the ROW. In addition, the Effie dump would be located more than 100 feet west and outside of the ROW (Map 6-69). Land ownership includes corporate, county-administered state, and state fee lands.

6.5.3 East Section

There are five alignment modifications proposed for the East Section: Bass Lake, Wilson Lake, Grass Lake, Dead Man's Pond, and Trout Lake (Map 4-14). These alignment modifications are described below in Section 6.5.3.1 through Section 6.5.3.5.

6.5.3.1 Bass Lake Alignment Modification

The Bass Lake Alignment Modification is located in the central portion of the Effie Variation Area (Map 4-15). This alignment modification is slightly longer (0.1 mile) than the comparable segment of the Proposed Blue/Orange Route (Table 4-5, Map 6-70). The Larson Lake State Forest Campground (George Washington State Forest) is located south of the Proposed Blue/Orange Route on the west side of Larson Lake. The Bass Lake County Park and Campground (managed by the Itasca County Land Department Park System, Grand Rapids, Minnesota) is located to the north of the Proposed Blue/Orange Route and surrounds Bass Lake. The Proposed Blue/Orange Route crosses lands designated as Outstanding Rank for the Preliminary MBS Sites of Biodiversity Significance (for more details, see Section 6.4.1). Land ownership includes corporate and state forest lands.

The Bass Lake Alignment Modification shifts the anticipated alignment approximately 750 feet southwest and away from the Bass Lake Itasca County Park (which includes a campground); however, it shifts the alignment closer to the Larson Lake State Forest campground (Map 6-70). This alignment modification crosses lands designated as Outstanding Rank for the Preliminary MBS Sites of Biodiversity Significance (for more details, see Section 6.4.1). Land ownership includes slightly more state land and less private corporate land compared to the Proposed Blue/Orange Route.

6.5.3.2 Wilson Lake Alignment Modification

The Wilson Lake Alignment Modification is located in the central portion of the Effie Variation Area

(Map 4-15). This alignment modification is the same length as the comparable segment of the Proposed Blue Route (Table 4-5, Map 6-71). The Proposed Blue Route crosses lands designated as Moderate Rank for the Preliminary MBS Sites of Biodiversity Significance (for more details, see Section 6.4.1). Land ownership includes corporate and state forest.

The Wilson Lake Alignment Modification shifts the anticipated alignment approximately 500 feet east from corporate and state forest lands onto an alignment with a greater percentage of state forest land (Map 6-71). This alignment modification crosses lands designated as Moderate Rank for the Preliminary MBS Sites of Biodiversity Significance (for more details, see Section 6.4.1).

6.5.3.3 Grass Lake Alignment Modification

The Grass Lake Alignment Modification is located in the northeast portion of the Balsam Variation Area (Map 4-17). The alignment modification is the same length as Proposed Blue Route (Table 4-5, Map 6-72). The Proposed Blue Route crosses Grass Lake, a MnDNR PWI waterbody and also a wild rice waterbody. There is one residence located within 1,000 feet west of the Proposed Blue Route, south of Grass Lake. Land ownership includes private, corporate, and county-administered state lands; part of the Proposed Blue Route follows a boundary between private and corporate lands.

The Grass Lake Alignment Modification shifts the anticipated alignment approximately 900 feet east to avoid crossing Grass Lake (Map 6-72). In addition, this alignment modification also shifts the transmission line east and away from one residence on the south end of Grass Lake, but shifts the alignment closer to six residences on the west side of Bray Lake. Land ownership includes corporate and state forest lands, and avoids private land.

6.5.3.4 Dead Man's Pond Alignment Modification

The Dead Man's Pond Alignment Modification is located in the central portion of the Dead Man's Pond Variation Area (Map 4-17). This alignment modification is the same length as the comparable segment of the Proposed Blue Route (Table 4-5, Map 6-73). There is one residence located east of and within 1,000 feet of the Proposed Blue Route. The Proposed Blue Route crosses and then follows the west side of CSAH 8 for about one-third of its length. Land ownership includes private, corporate, and county-administered state forest lands; part of the Proposed Blue Route follows a boundary between private and county-administered state forest lands.

The Dead Man's Pond Alignment Modification shifts the anticipated alignment approximately 1,000 feet west and away from one residence located near CSAH 8. However this modification shifts the alignment closer to two residences located along CSAH 57 and on to more private land. In addition, while this alignment modification crosses the CSAH 8 and CSAH 57, it does not parallel the highway corridors (Map 6-73). The alignment modification crosses Dead Man's Pond, a MnDNR PWI waterbody. In addition, this alignment modification crosses lands designated as Moderate Rank for the Preliminary MBS Sites of Biodiversity Significance (for more details, see Section 6.4.4). Land ownership includes more private, corporate, and county-administered state forest lands; but shifts the alignment west from the boundary between private and county-administered state forest lands onto private land.

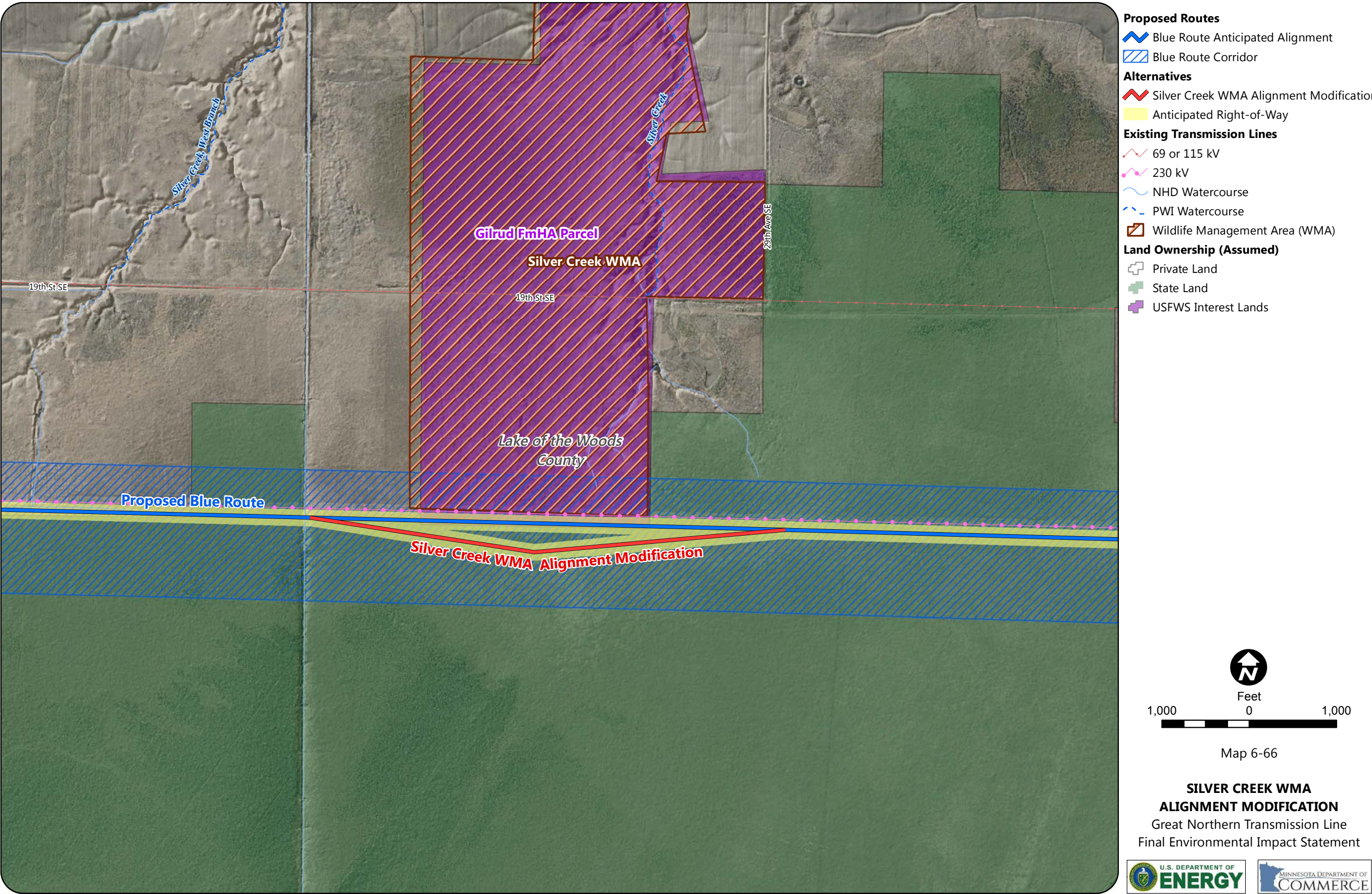
6.5.3.5 Trout Lake Alignment Modification

The Trout Lake Alignment Modification is located in the central portion of the Blackberry Variation Area (Map 4-17). This alignment modification is the same length as the comparable segment of the Proposed Blue Route (Table 4-5, Map 6-74). There are three residences within 1,000 feet of the Proposed Blue Route. For about half of its length (north end), the Proposed Blue Route crosses corporate land, and then it follows the boundary between corporate and private land.

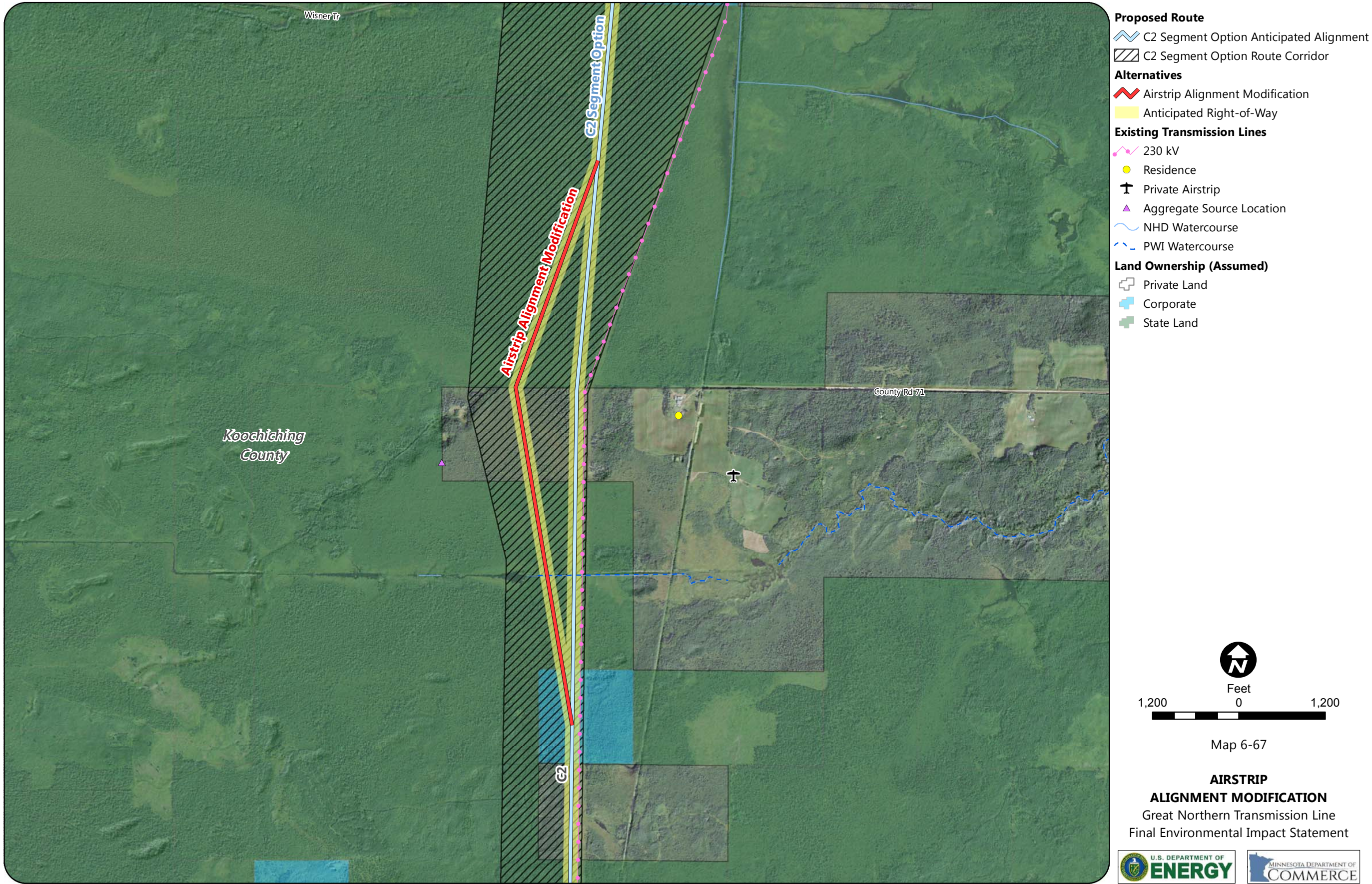
The Trout Lake Alignment Modification shifts the anticipated alignment away from the two residences located west of the Proposed Blue Route, so only the one residence located within 1,000 feet to the southeast (south of CSAH 70) is still within 1,000 feet of this alignment (Map 6-74). Land ownership is corporate.

This page left blank intentionally

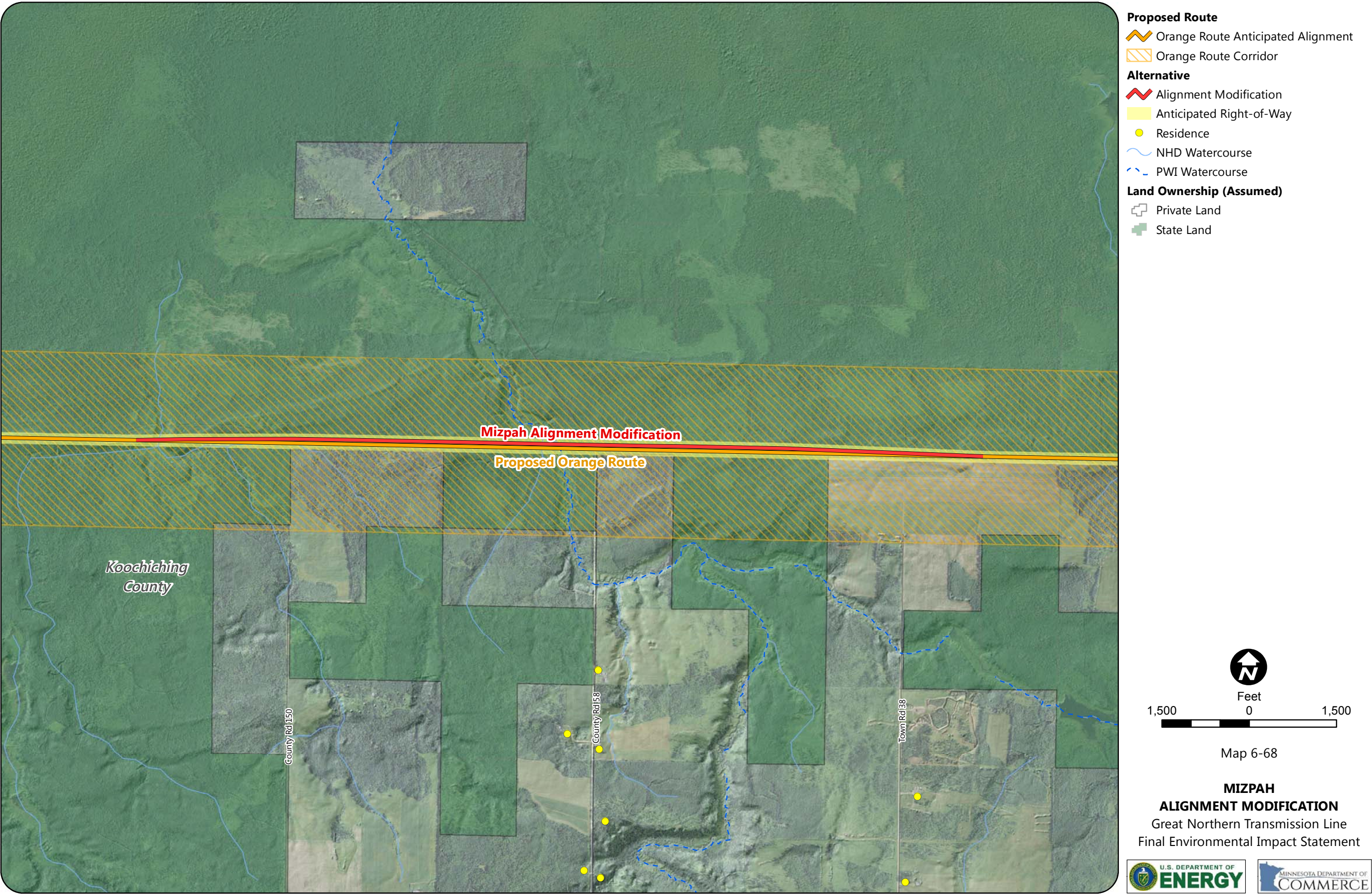
Map 6-66 Silver Creek WMA Alignment Modification



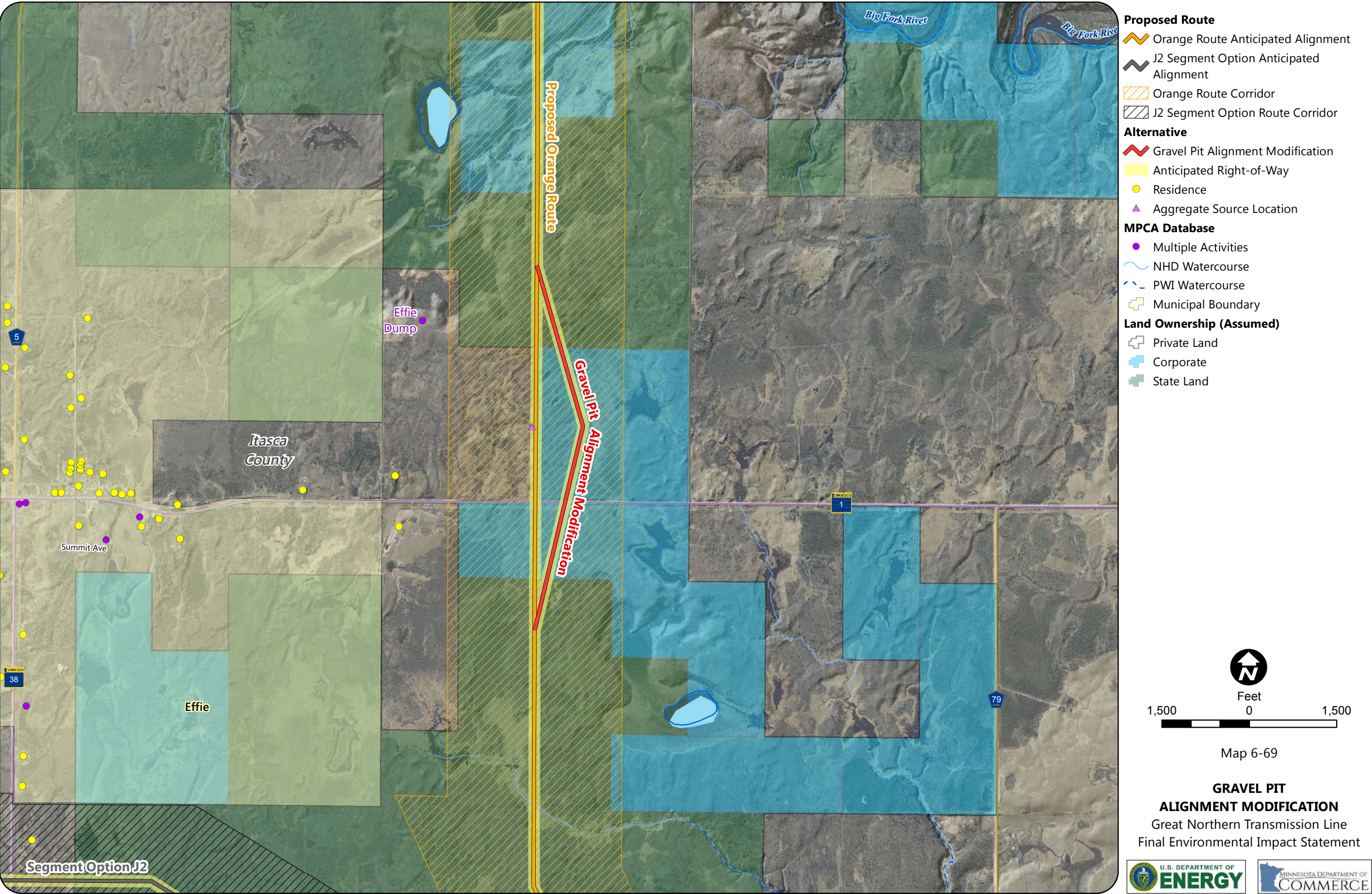
Map 6-67 Airstrip Alignment Modification



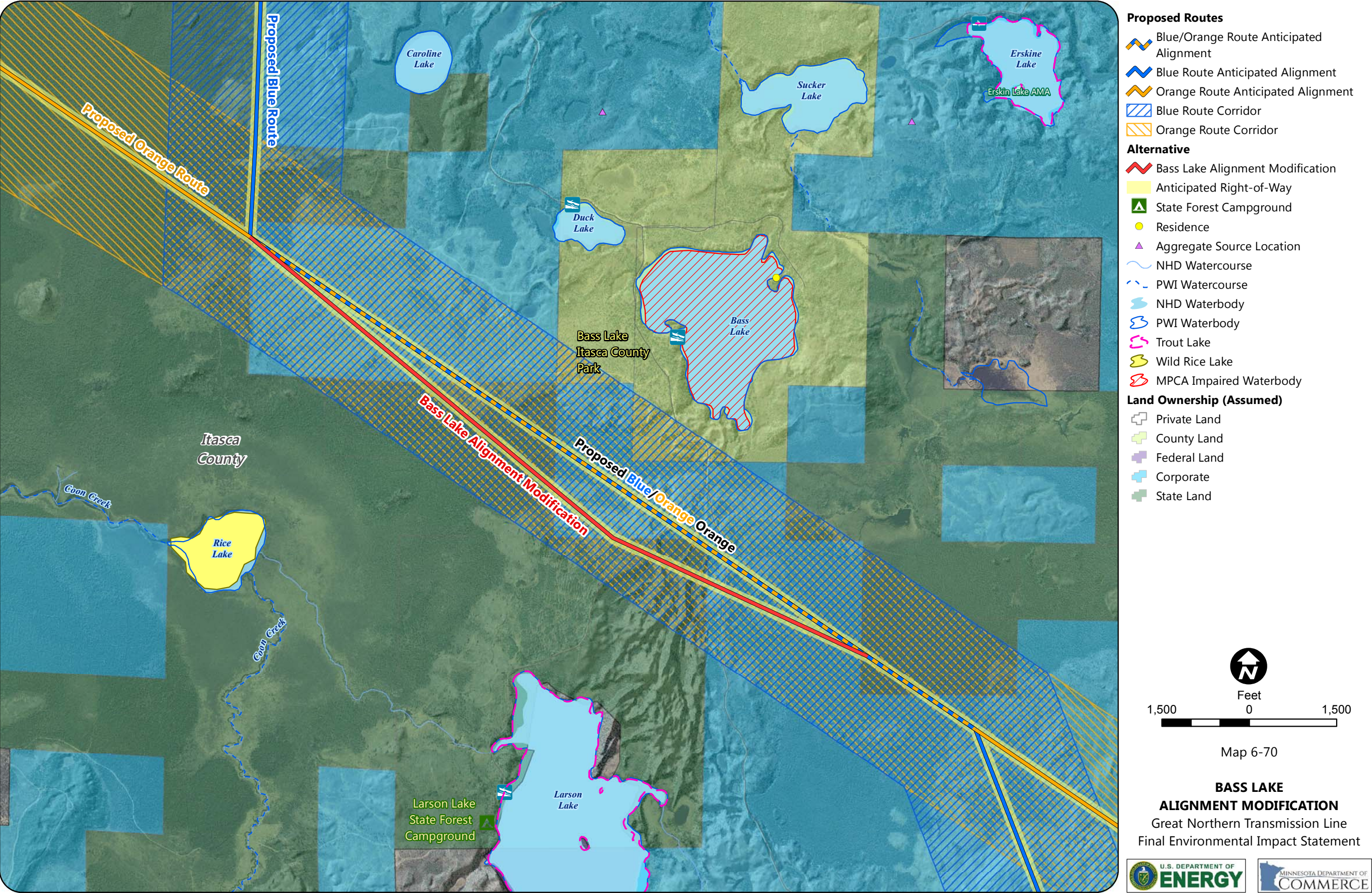
Map 6-68 Mizpah Alignment Modification



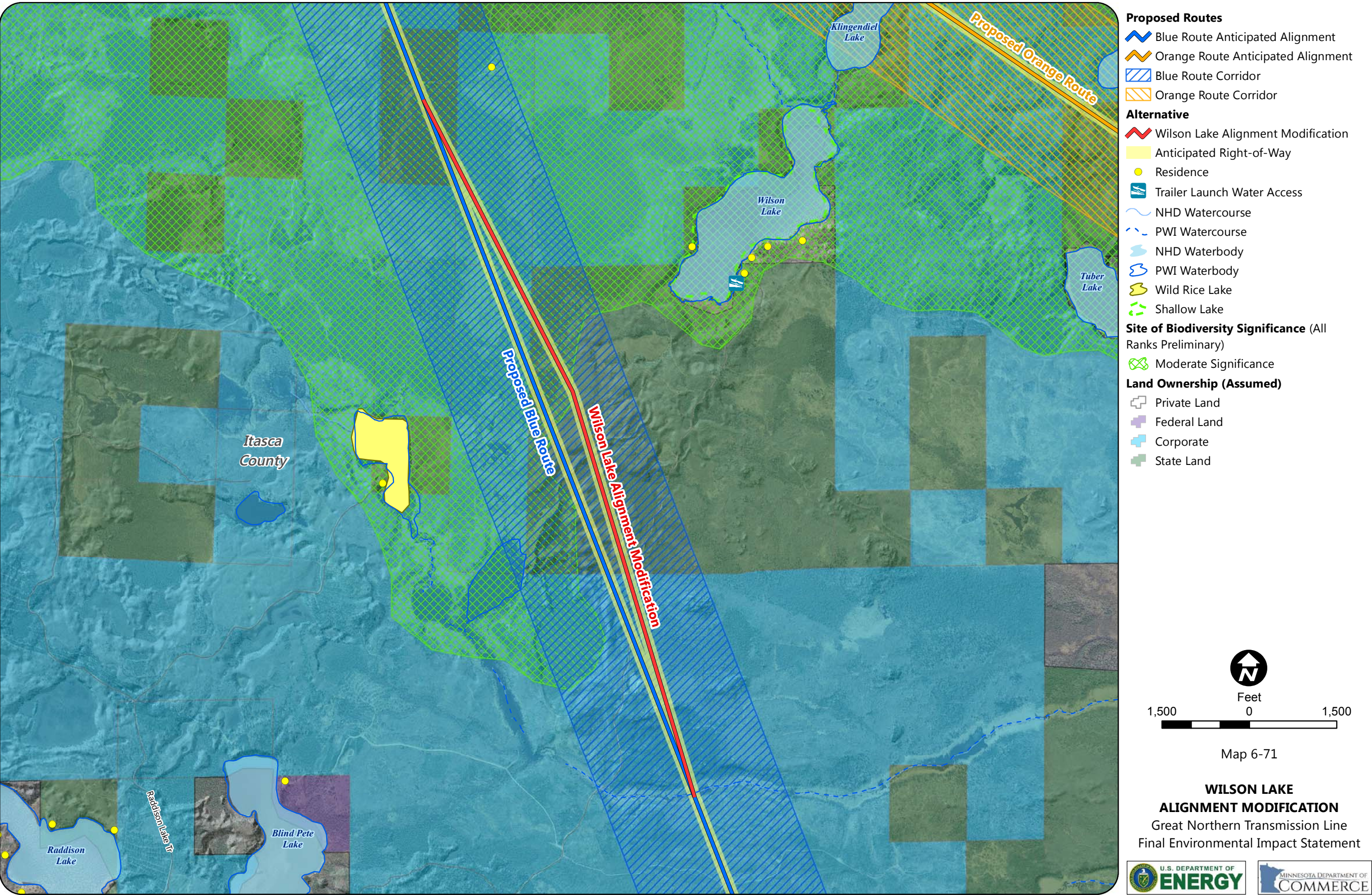
Map 6-69 Gravel Pit Alignment Modification



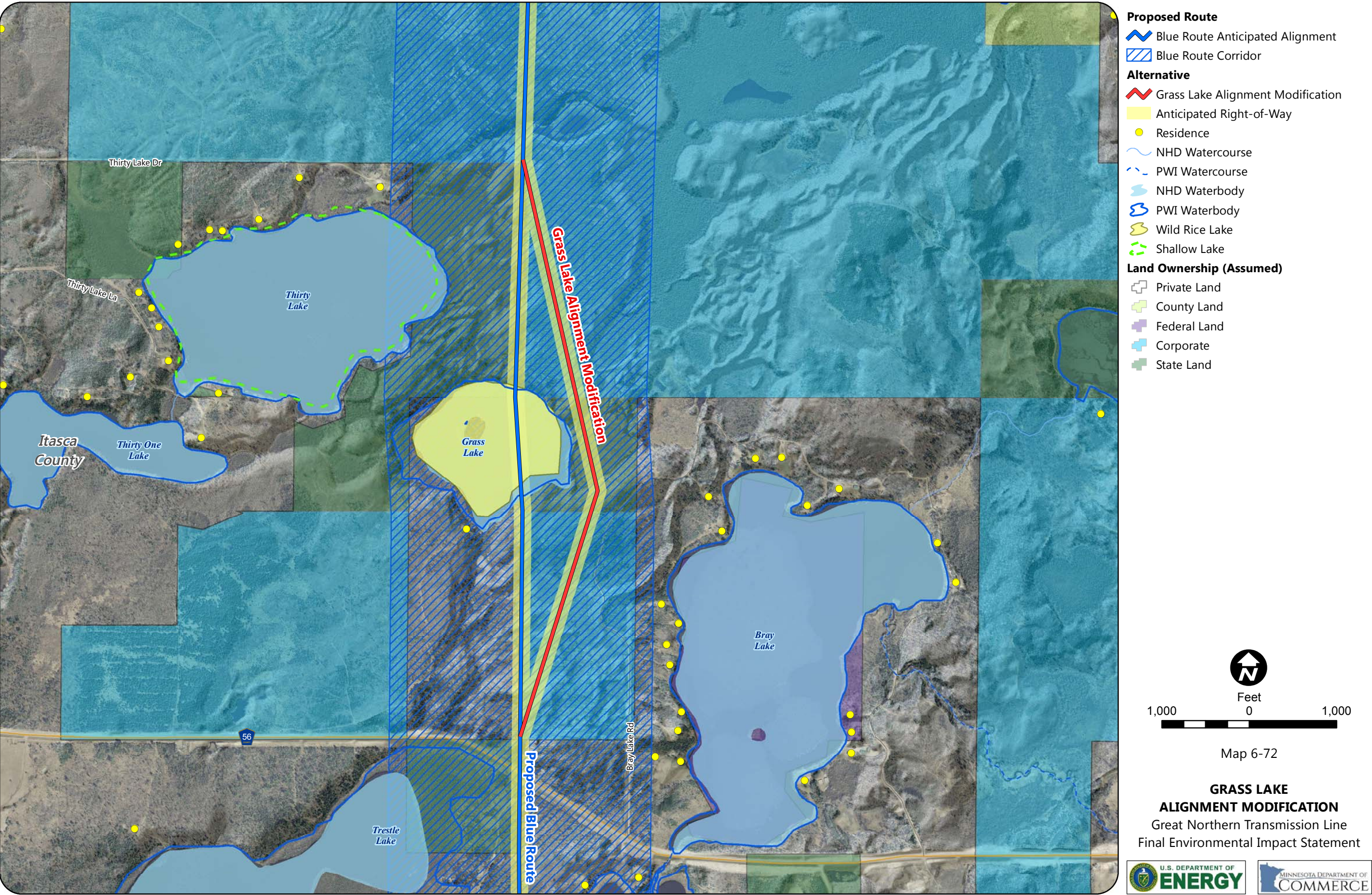
Map 6-70 Bass Lake Alignment Modification



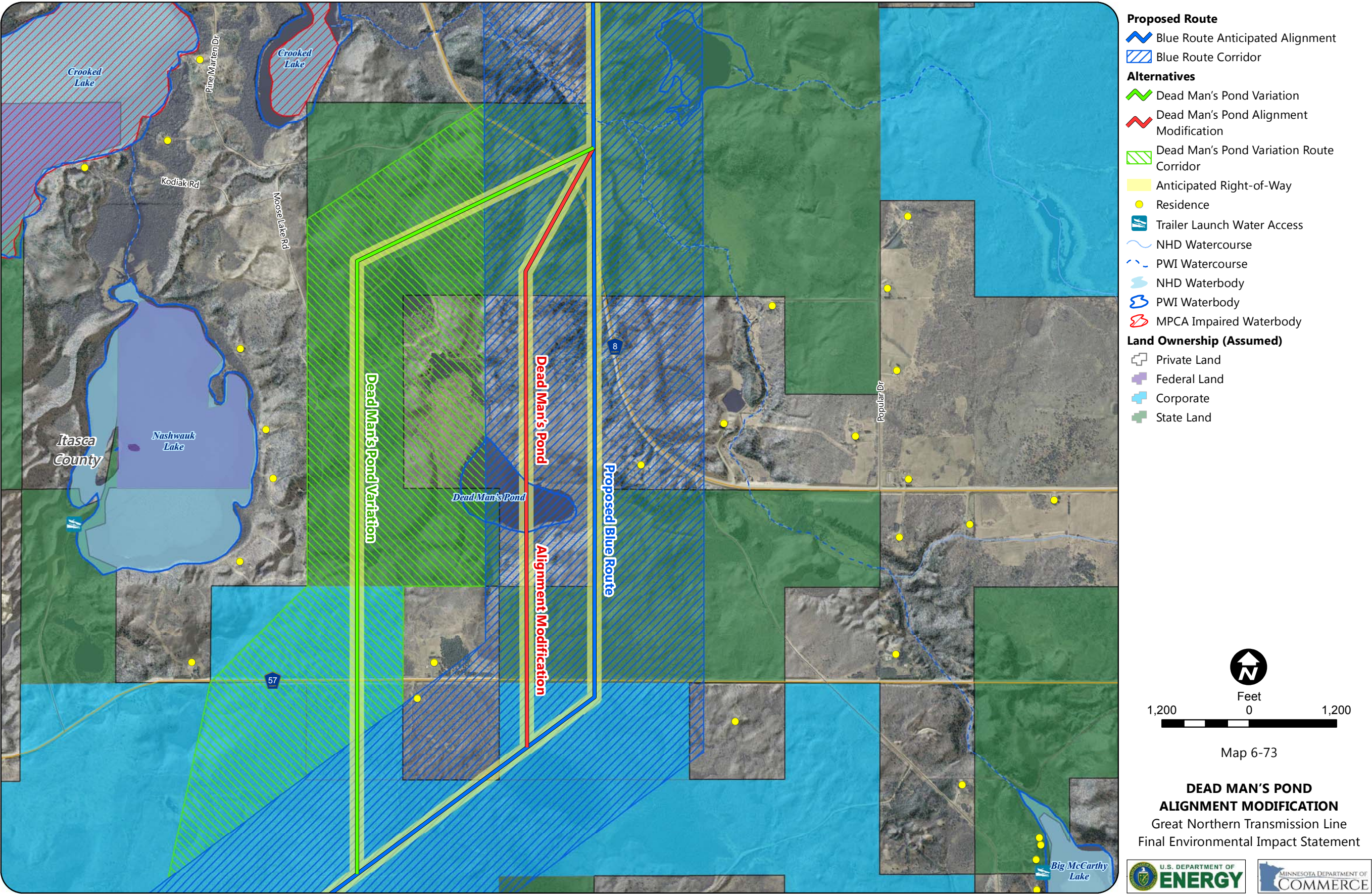
Map 6-71 Wilson Lake Alignment Modification



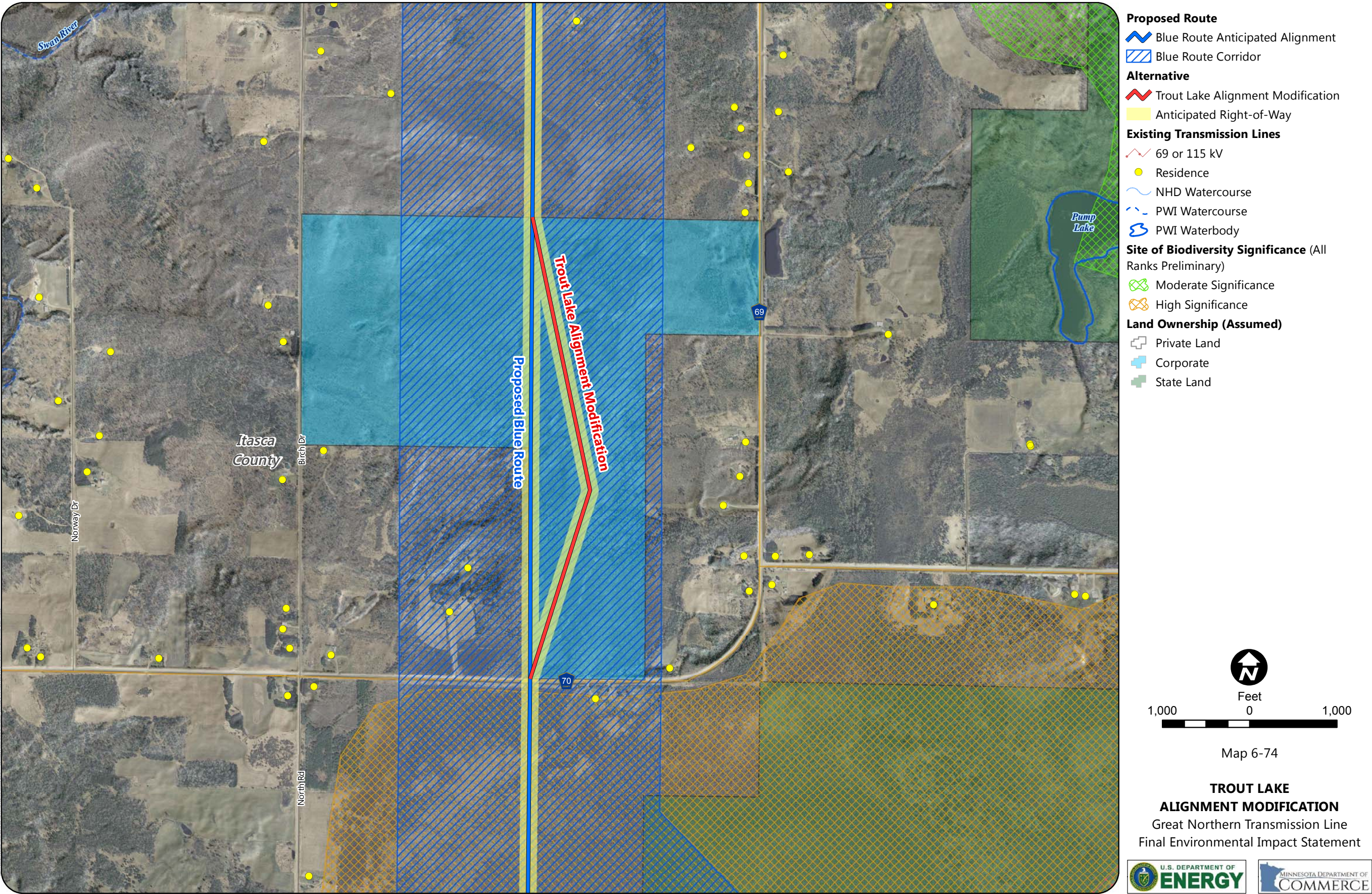
Map 6-72 Grass Lake Alignment Modification



Map 6-73 Dead Man's Pond Alignment Modification



Map 6-74 Trout Lake Alignment Modification



This page left blank intentionally

6.6 Hops

There are five hops identified for the proposed Project as described in Chapter 4. Additional details are provided in Appendix E.

6.6.1 West Section

There are five hops identified for the proposed Project in the West Section – Hops 1, 2, 3, 4, and 5. Hops 1, 2, and 3 provide a connection for the Proposed Blue/Orange Route and Variation in the Cedar Bend WMA Variation Area to the variations in the Beltrami North and Beltrami North Central variation areas. Hops 3 and 4 provide a connection for the Proposed Blue/Orange Route and Beltrami North Variation 1 in the Beltrami North Variation Area to the Beltrami North Central Variations 3 and 4 in the Beltrami North Central Variation Area. Hop 5 provides a connection from the south end of Beltrami North Central variations 4 and 5 west to the Proposed Orange Route.

Hop 1

Hop 1 is located in the southeastern portion of the Cedar Bend WMA Variation Area (Map 4-5) and the northwestern corner of the Beltrami North Central Variation Area (Map 4-7). The length of Hop 1 is approximately 0.7 miles (Map 6-75). The closest residence to this hop is approximate 0.7 miles to the northwest. Land ownership includes only state forest lands; it crosses Lake of the Woods and Beltrami Island state forests (Map 6-13). Hop 1 crosses the existing 500 kV transmission line. The entire length of the hop crosses either shrub or forested wetlands (Map 6-13). This hop crosses MBS Sites of Biodiversity Significance ranked as high or moderate significance (Map 6-14).

Hop 2

Hop 2 is located in the southeastern portion of the Cedar Bend WMA Variation Area (Map 4-5) and the northwestern corner of the Beltrami North Central Variation Area (Map 4-7). The length of Hop 2 is approximately one mile (Map 6-75). The closest residence to this hop is approximate 0.7 miles to the northwest. Land ownership includes only state forest lands. The hop crosses Lake of the Woods and Beltrami Island state forests (Maps 6-13 and 6-23). Hop 2 parallels an existing 230 kV transmission line for its entire length. The entire length of the hop crosses either shrub or forested wetlands (Maps 6-13 and 6-23). This hop crosses MBS Sites of Biodiversity Significance ranked as high or moderate significance (Maps 6-14 and 6-24).

Hop 3

Hop 3 is located in the southeastern portion of the Cedar Bend WMA Variation Area (Map 4-5) and the northwestern corner of the Beltrami North Central Variation Area (Map 4-7). The length of Hop 3 is approximately 1.2 miles (Map 6-75). The closest residence to this hop is approximate 1.3 miles to the northwest. Land ownership includes only state forest lands; it crosses Beltrami Island state forest (Map 5-5). Hop 3 crosses the existing 500 kV transmission line. The entire length of the hop crosses either shrub or forested wetlands (Maps 6-13 and 6-23). This hop crosses MBS Sites of Biodiversity Significance ranked as high or moderate significance (Maps 6-14 and 6-24).

Hop 4

Hop 4 is located in the eastern portion of the Beltrami North Variation Area (Map 4-6) and the northwestern corner of the Beltrami North Central Variation Area (Map 4-7). The length of Hop 4 is approximately one mile (Map 6-75). The closest residence to this hop is approximate 1.2 miles to the northwest. Land ownership includes only state forest lands; it crosses Beltrami Island state forest (Map 6-18). Hop 4 does not cross any existing transmission lines. The entire length of the hop crosses either shrub or forested wetlands (Map 6-18). This hop crosses MBS Sites of Biodiversity Significance ranked as high significance (Map 6-19).

Hop 5

Hop 5 is located in the southwestern portion of the Beltrami North Central Variation Area (Map 4-7). The length of Hop 5 is approximately 3.5 miles (Map 6-76). The closest residence to this hop is approximate 0.4 miles to the north. Land ownership includes private and state forest; it crosses Lake of the Woods and Beltrami Island state forests (Map 6-18). The Border Trails snowmobile trail crosses this hop once (Map 5-5). The eastern end of the hop crosses an unnamed watercourse (Map 6-76). Hop 5 crosses the existing 500 kV transmission line. The entire length of the hop crosses emergent, shrub, or forested wetlands (Map 6-18). This hop crosses MBS Sites of Biodiversity Significance ranked as high or unknown significance (Map 6-19).

6.6.2 Central Section

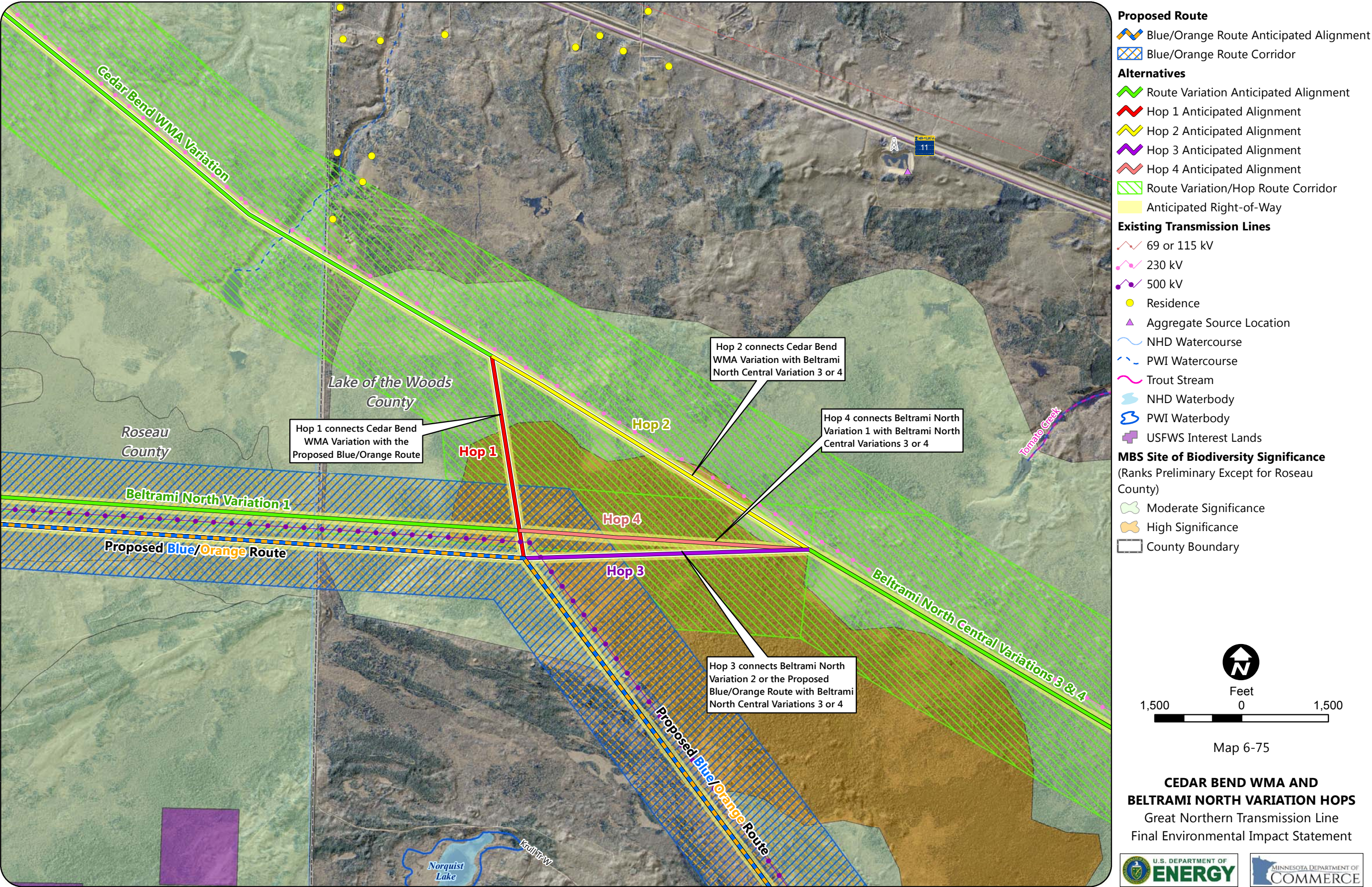
There are no hops identified in the Central Section.

6.6.3 East Section

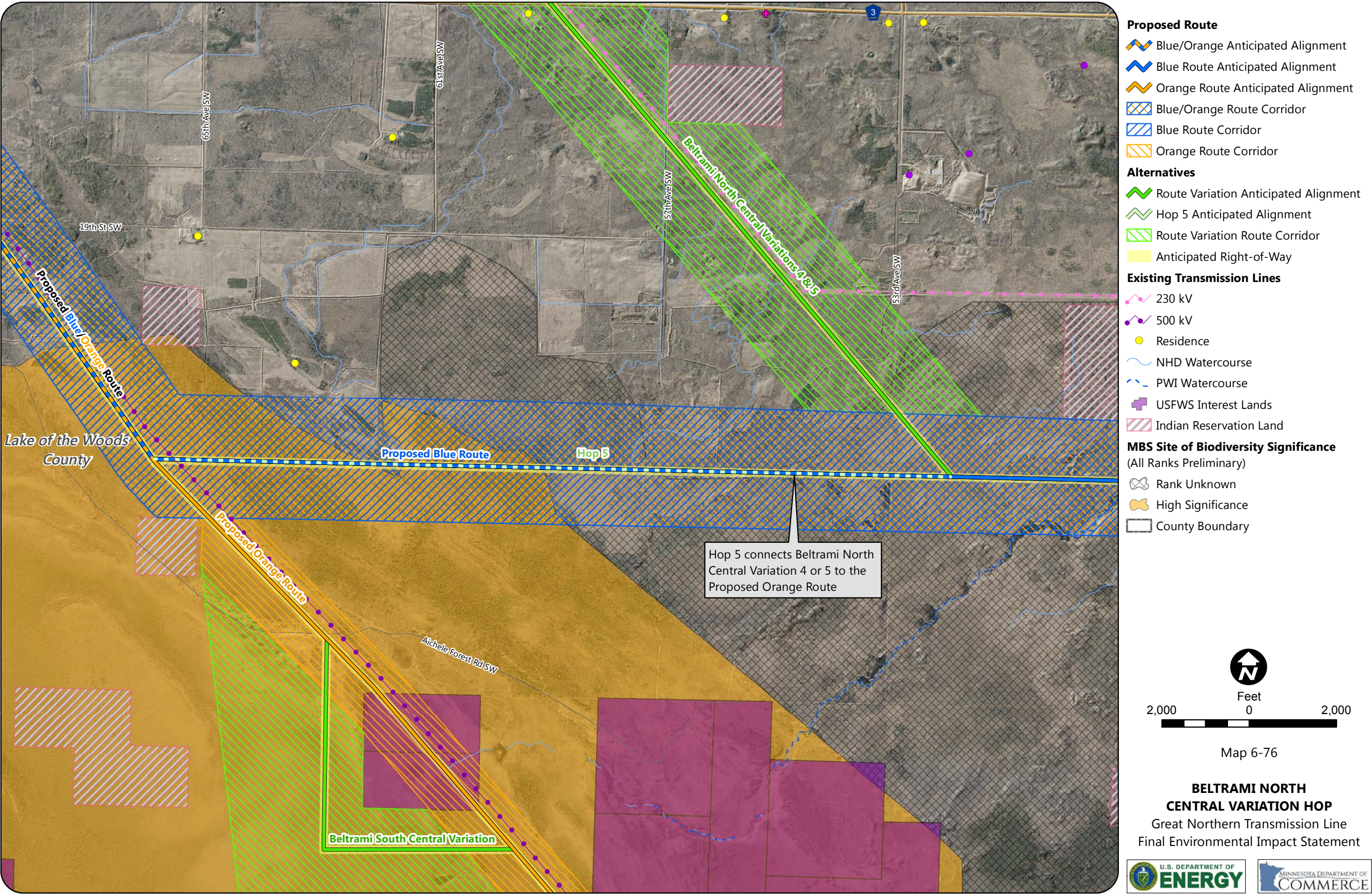
There are no hops identified in the East Section.

This page left blank intentionally

Map 6-75 Cedar Bend WMA and Beltrami North Variation Hops



Map 6-76 Beltrami North Central Variation Hop



6.7 Associated Facilities

The associated facilities for the proposed Project include the 500 kV Series Compensation Station, regeneration stations, and **proposed Iron Range 500 kV Substation**. Information regarding these associated facilities are provided in Chapter 2. Additional details are provided in Appendix E.

6.7.1 West Section

The associated facility located in the West Section are two regeneration stations and the proposed 500 kV Series Compensation Station.

6.7.1.1 Proposed Regeneration Stations

There are two proposed regeneration stations located along the Proposed Blue/Orange Route within the West Section (Map 6-77). The Warroad SCS and Rd 2 regeneration stations are located in the central portion of the Beltrami North Variation Area (Map 4-6) and Beltrami North Central Variation Area (Map 4-7), respectively.

The site for the Warroad SCS regeneration station is located in an upland area adjacent to the Proposed Blue/Orange Route on the east side of CSAH 2 (Map 6-18). There is a residence located approximately 0.6 miles northwest of the site (Map 6-16). Winter Road River is located approximately 0.1 mile north of the site (Map 6-18). Land ownership consists of private lands (Map 6-16).

The site for the Rd 2 regeneration station is located in an upland area adjacent to Route 5 (Map 6-23). There is a residence located approximately 0.13 miles south of the site (Map 6-21). Land ownership is private lands (Map 6-21).

6.7.1.2 Proposed 500 kV Series Compensation Station

The 60-acre site for the proposed 500 kV Series Compensation Station is located in the central portion of the Beltrami North Variation Area (Map 4-6). The nearest residence is located approximately 0.4 miles north of the site (Map 6-78). Land ownership includes private land with MnDNR-identified potential mineral resources (Map 6-16) and scattered NWI-identified emergent wetlands (Map 6-78). Based on U.S. Geological Survey (USGS) GAP land cover data, the southern half of the site is in the USDA Farm Service Agency Conservation Reserve Program.

The 500 kV Series Compensation Station would contain 500 kV series capacitor banks and other large-scale electrical equipment and structures

similar to those comprising most large substations. Depending on its location and surrounding elements in the landscape, the 500 kV Series Compensation Station could contrast strongly with its surroundings. It may be noticeable in foreground or middle ground views from residences or other sensitive visual resources, therefore it has the potential to result in significant aesthetic impacts.

6.7.2 Central Section

The associated facilities located in the Central Section are the four proposed regeneration stations.

6.7.2.1 Proposed Regeneration Stations

There are four proposed regeneration stations located along the Proposed Blue Route and one proposed regeneration station located along the Proposed Orange Route within the Central Section (Map 6-77). The Rd 158 regeneration station is located in the northern portion of the Pine Island Variation Area. The two options for the Hwy 71 regeneration station are located in the southern portion of the C2 Segment Option Variation Area. The third Hwy 71 regeneration station is located in the northern portion of the J2 Segment Option Variation Area.

The site for the Rd 158 regeneration station is located in an upland area adjacent to Route 5 (Map 6-28). There is a residence located approximately 0.1 miles and 0.2 miles to the southeast and northeast of the site, respectively (Map 6-26). Land ownership is private lands (Map 6-26).

The site for the Hwy 71 regeneration station (option 1) is located in an emergent and forested wetland area adjacent to State Highway 71 (Map 6-43). There is a residence located approximately 2.5 north of the site (Map 6-41). Land ownership is state forest lands (Map 6-41). This site is located within a MBS Site of Biodiversity Significance ranked as unknown significance (Map 6-44).

The site for the Hwy 71 regeneration station (option 2) is located in an upland area adjacent to State Highway 71 (Map 6-43). There is a residence located approximately 2 miles north of the site (Map 6-41). An unnamed river is located approximately 0.1 mile northeast of the site (Land ownership is state forest lands (Map 6-43). Land ownership is state forest lands (Map 6-43).

The site for the third Hwy 71 regeneration station is located in an upland area between State Highway 71 to the west and a forest wetland to the east (Map 6-48). There is a residence located

approximately 1.4 miles southwest of the site (Map 6-46). Land ownership is state forest lands (Map 6-46). This site is located within a MBS Site of Biodiversity Significance ranked as unknown significance (Map 6-49). The regeneration stations consist of fairly small buildings that house infrastructure to boost the data signal passing through the optical fiber cable associated with the transmission line. Although the regeneration stations may contrast somewhat with their surroundings, the new transmission line nearby would produce stronger contrast and be more dominant due to its substantially taller height and contrasting form.

6.7.3 East Section

The associated facility located in the East Section is the two proposed regeneration stations and the proposed **Iron Range** 500 kV Substation.

6.7.3.1 Proposed Regeneration Stations

There is one proposed regeneration station located along the Proposed Blue Route and one proposed regeneration station located along the Proposed Orange Route within the East Section (Map 6-77). The Rd 287 and Hwy 1 regeneration stations are located in the southeastern portion of the Effie Variation Area.

The site for the Rd 287 regeneration station is located in an upland area just south of the intersection of CSAH 42 and CR 287 (Map 6-53). There is a residence located approximately 0.4 miles southwest of the site (Map 6-51). The Big Fork River is located approximately 0.5 miles west of the site (Map 6-53). Land ownership is private lands (Map 6-51).

The site for the Hwy 1 regeneration station is located in an upland area near the intersection of State Highway 1 and Township Road 751 (Map 6-53). The closest residence is located approximately 0.2 miles northwest of the site (Map 6-51). Land ownership is county-administered state forest lands (Map 6-51).

6.7.3.2 Proposed Iron Range 500 kV Substation

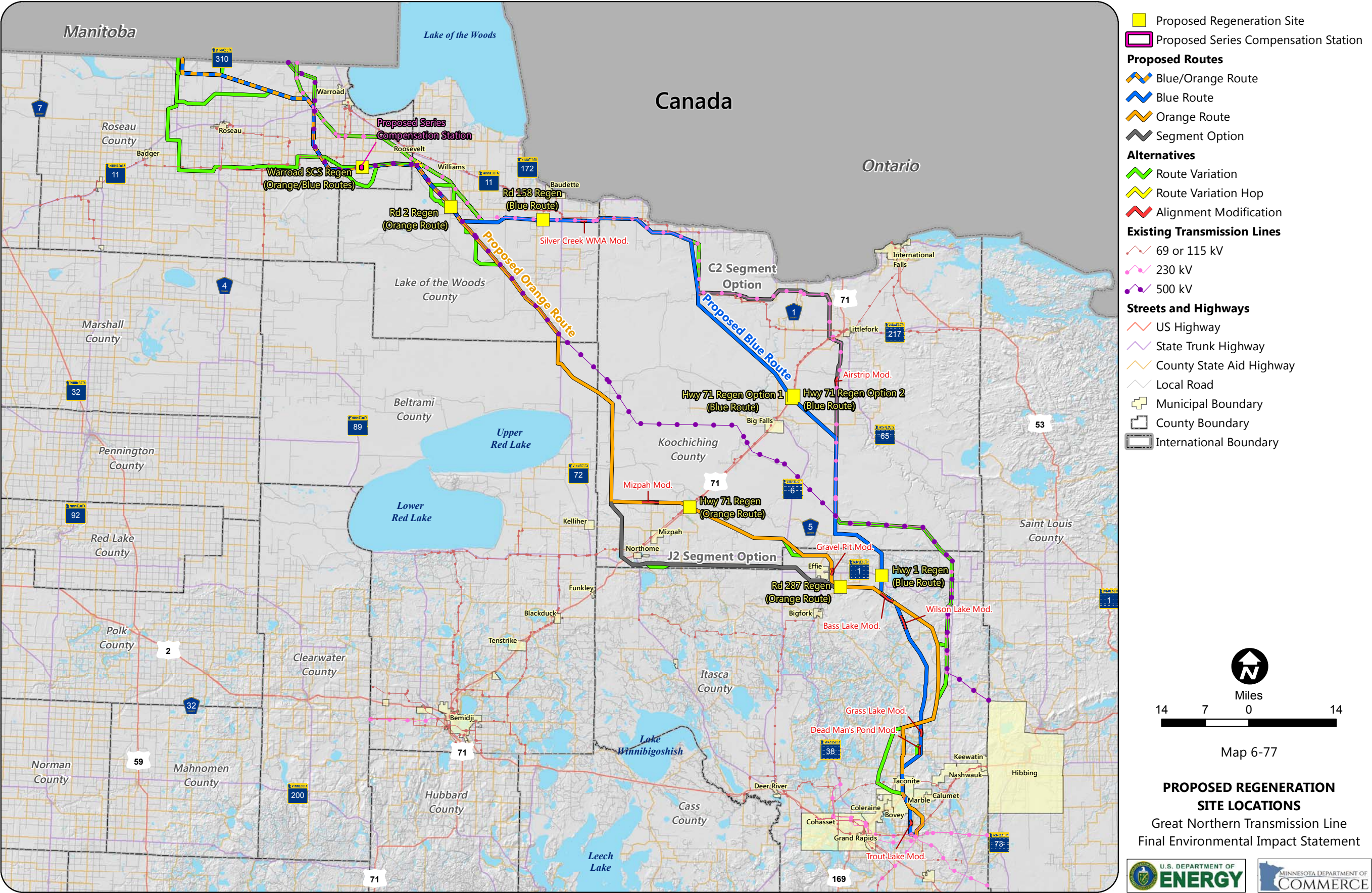
The proposed Iron Range 500 kV Substation would be located at the terminus of the Proposed Blue Route or the Proposed Orange Route adjacent to and approximately 0.25 miles east of the existing Blackberry Substation in the Blackberry Variation Area in the East Section (Map 6-79). There are existing transmission line corridors on the southwest and southeast sides of the **proposed** fenced

substation area. Three residences are located north of the **proposed** fenced substation site: 0.14 miles north from the northwest corner, 0.11 miles northeast of the northeast corner, and 0.24 miles northeast of the northeast corner (Map 6-79). Noise levels for the proposed **Iron Range** 500 kV Substation is discussed in Section 5.2.1.2.

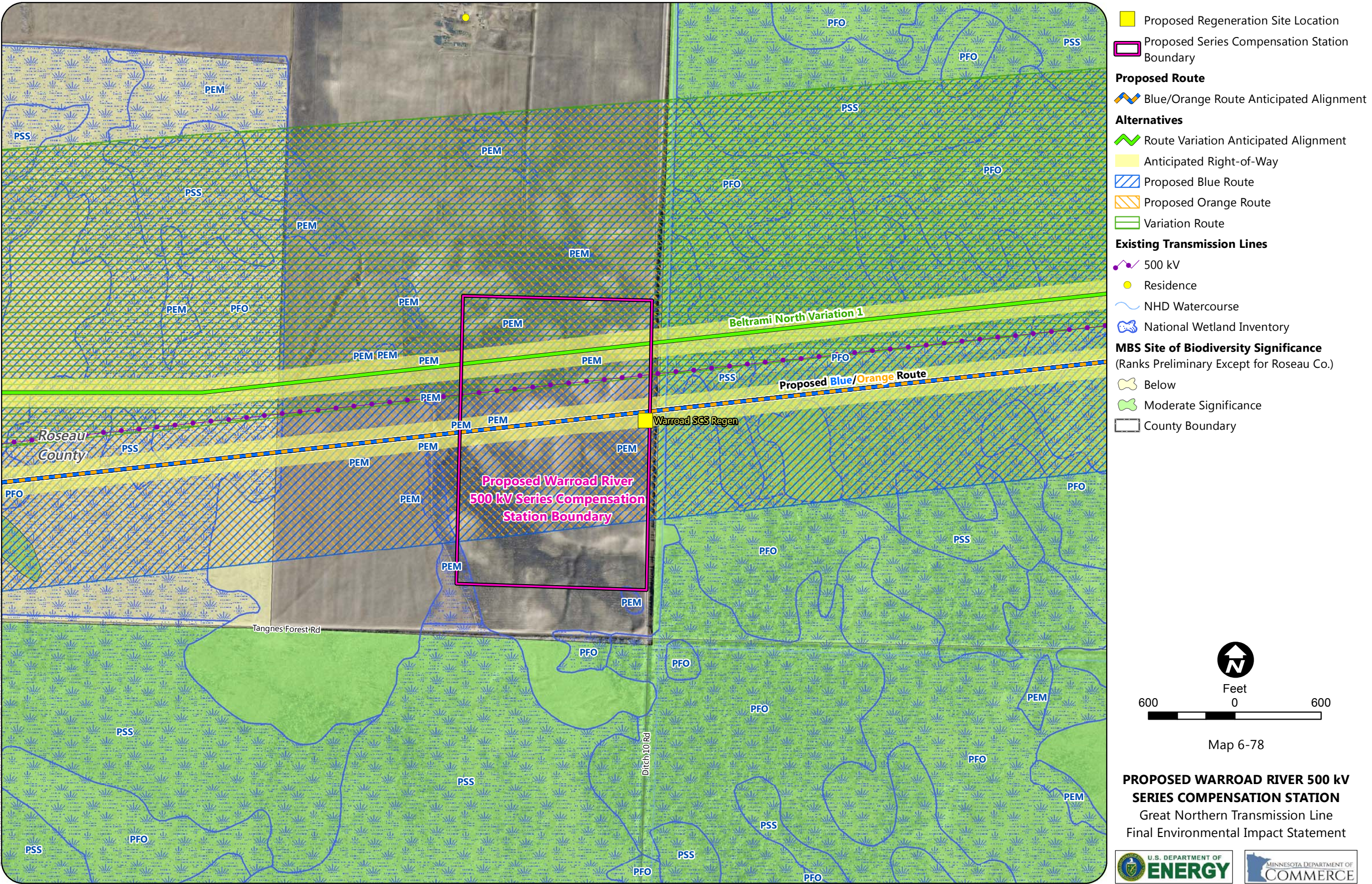
The fenced area of the **proposed** substation is approximately **23** acres (Map 6-79). There are two access roads that connect from CR 434 to the northeast and northwest areas of the **proposed** substation. The access roads cross upland areas and are each 0.5 miles in length. Near CR 434, the access roads are 20 feet wide and lead to a parking lot just outside the fenced area that is approximately 70 feet by 60 feet. The north-central portion of the fenced area of the **proposed** substation directly impacts 0.3 acres of a shallow marsh/forested wetland complex (Map 6-79). Wetlands are identified south of the **proposed** fenced substation site, but would not be impacted by the proposed Project. No other natural resources were identified within or nearby the **proposed** fenced substation area.

The proposed **Iron Range** 500 kV Substation would contain many of the same elements as the existing substation and be similar in appearance and scale to it. Several existing large transmission lines extend through the area in the immediate vicinity of the new substation and enter the existing substation nearby. Because the **proposed Iron Range 500 kV** Substation would be visible in the same views from surrounding locations, the addition of the proposed substation adjacent to the existing substation and transmission lines would result in only an incremental increase in contrast for these views. The incremental increase in contrast would be slightly greater where the proposed substation is located between the existing substation and viewers and slightly less where the proposed substation is located on the opposite side of the existing substation from viewers.

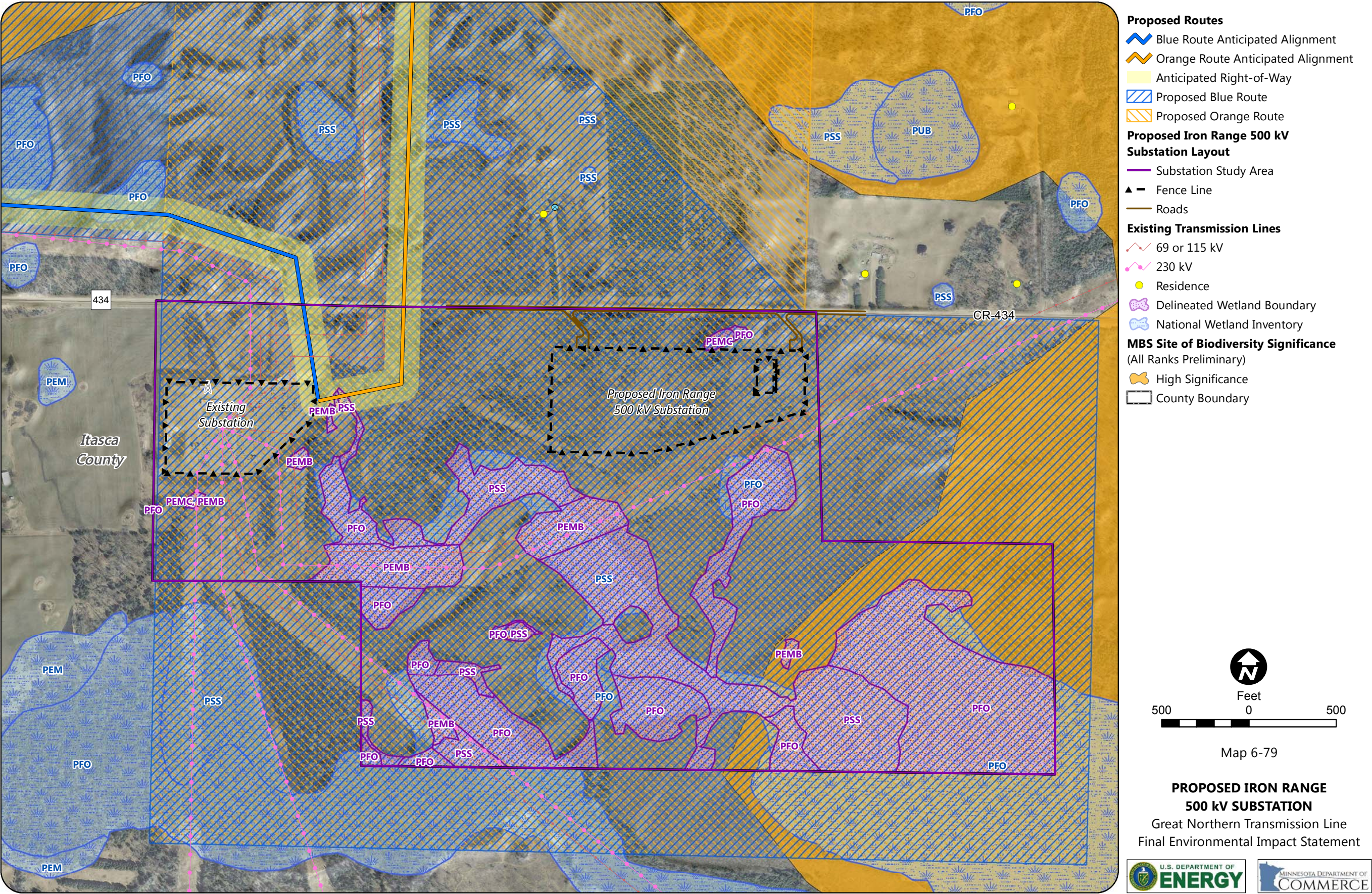
Map 6-77 Proposed Regeneration Site Locations



Map 6-78 Proposed Site of Series Compensation Facilities



Map 6-79 Proposed Blackberry 500 kV Substation



This page left blank intentionally

7.1 Cumulative Impacts Analysis

In addition to analyzing the direct and indirect impacts of the alternatives—which include the proposed Project routes and variations presented in Chapter 5 and Chapter 6—the federal environmental review process requires consideration of the cumulative environmental impacts of multiple actions within an area. Cumulative impacts result from the “incremental impact of the [current] action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time” (40 Code of Federal Regulations (CFR) 1508.7).

Similarly, Minnesota’s environmental review rules require the evaluation of “cumulative potential effects” which is defined as “the effect on the environment that results from the incremental effects of a project in addition to other projects in the environmentally relevant area that might reasonably be expected to affect the same environmental resources, including future projects actually planned or for which a basis of expectation has been laid, regardless of what person undertakes the other projects or what jurisdictions have authority over the projects” (Minnesota Rules, part 4410.0200, subpart 11a).

The cumulative impacts analysis, as provided in Section 7.2 and Section 7.3, consists of two parts: identification of other actions that are considered along with the proposed Project in analyzing cumulative impacts, and a description (quantitative or qualitative) of those potential cumulative impacts.

7.2 Other Actions Considered for Potential Cumulative Impacts

The potential for cumulative impacts depends, in part, on temporal factors within the environment. The temporal boundaries for cumulative impacts include past actions, ongoing actions, and reasonably foreseeable future actions that cover the construction period of the proposed Project (beginning in fall 2017) and the beginning of operations (summer 2020). The temporal period would also carry through the life of the proposed Project for operational impacts, such as aesthetic or electric and magnetic fields (EMF) effects. Accordingly, this section identifies past, present, and reasonably foreseeable future actions considered in the cumulative impacts analysis.

7.2.1 Past Actions

Past actions are those actions and their associated impacts that occurred within or influenced the geographic region of influence (ROI) of each resource and have shaped the current affected environment of the proposed Project area. For the purposes of this Environmental Impact Statement (EIS), actions that have occurred in the past and their associated impacts are now part of the existing environment and are included in the affected environment described in Chapter 5.

7.2.2 Present and Reasonably Foreseeable Future Actions

This section describes reasonably foreseeable projects that are (1) under construction, have permits, or have submitted permit applications, and (2) have the potential to collectively impact resources within the proposed Project’s ROI for the various resources evaluated in Chapter 5 and Chapter 6. The types of projects considered include roadways, railroad lines, industrial facilities, and energy projects such as power plants, transmission lines, and pipelines.

The Minnesota Department of Transportation (MnDOT) Statewide Transportation Improvement Program (STIP) and current amendments and modifications to the STIP identify various transportation projects in the vicinity of the proposed Project for the period of 2015-2018 (MnDOT 2014, reference (191)). Review of the planned projects for MnDOT Districts 1B and District 2A,⁸⁶ which include the proposed Project area, indicates that the planned transportation projects generally consist of routine maintenance activities such as roadway re-surfacing, asphalt surface treatment, bridge repair, asphalt surface treatments, concrete paving, railroad crossings, signage, and pedestrian/bike trail improvements. Based on the STIP, other than the routine maintenance activities, there are no roadway projects presently planned or reasonably foreseeable within the vicinity of the proposed Project, including the areas adjacent to the Applicant’s proposed international border crossing and alternative international border crossings.

The Minnesota Department of Commerce (MN DOC) project database was also reviewed to identify any power plant, transmission line, pipeline, or wind projects currently open or permitted in the vicinity of the proposed Project, as these would also be

⁸⁶ Map available at <http://www.dot.state.mn.us/information/docs/district-map-with-sub-areas.pdf>

reasonably foreseeable projects.⁸⁷ According to this review, one power plant with an associated transmission line and natural gas pipeline (Excelsior Energy's Mesaba Energy project) and one 230 kilovolt (kV) transmission line (Minnesota Power's Nashwauk Project) have been issued permits since 2010 by the Minnesota Public Utilities Commission (MN PUC) but have not yet been constructed. In addition, as part of the route permit process for the proposed Enbridge Sandpiper oil pipeline project, the MN PUC has included one route for consideration that would cross the 200-foot right-of-way (ROW) of this proposed Project (from west to east).⁸⁸ The proposed Enbridge Line 3 project, another oil pipeline, would follow the same route as the proposed Enbridge Sandpiper project from the terminal in Clearbrook, Minnesota to the terminal in Superior, Wisconsin terminal.

In summary, portions of the permitted routes for the Mesaba Energy and Nashwauk transmission line projects are within the Applicant's proposed routes. One of the proposed Enbridge Sandpiper routes and the Enbridge Line 3 route, under consideration by the MN PUC, would cross the alternatives for the proposed Project. Therefore, since these transmission line and pipeline projects are reasonably foreseeable projects that could occur in the vicinity of the proposed Project, they are described below.

7.2.2.1 Excelsior Energy Mesaba Energy Project

On March 12, 2010, the MN PUC issued a large electric power generating plant site permit to Excelsior Energy to construct the Mesaba Energy project in Itasca County (Map 7-1). The Mesaba Energy project was originally proposed as a 1,200 megawatt (MW) (net) coal-feedstock integrated gasification combined cycle power plant. In addition to the site permit, the MN PUC also issued a pipeline permit and a Route Permit for a 345 kV transmission line to connect the proposed power plant into the existing Blackberry Substation.⁸⁹ Construction has not started on the power plant, the natural gas pipeline, or the transmission line.

On May 31, 2012, the MN PUC received a letter from Excelsior Energy stating that it intends to develop only the combined-cycle power block portion of the

project, eliminating the syngas production portions (i.e., gasification island, air separation unit, coal/pet-coke feedstock handling and storage, syngas treating unit, sulfur recovery and tail gas recycle units, etc.) of the project and operating the facility as a natural gas-fueled combined-cycle.⁹⁰ Excelsior Energy also indicated that it plans to construct the coal gasification if and when it becomes feasible to do so from economic and regulatory standpoints (Excelsior Energy 2012, reference (192). Minnesota Statutes, section 216B.1694, subdivision 3, states that the site and route permits and water appropriation approvals for an innovative energy project must also be deemed valid for a power plant meeting the requirements of paragraph (a) and shall remain valid until the earlier of (i) four years from the date the final required state or federal preconstruction permit is issued or (ii) June 30, 2019.

As shown in Map 7-1, the permitted route for Excelsior Energy's approximately 10-mile long, 345 kV transmission line would be located within the Proposed Blue Route and Proposed Orange Route for about 1.2 miles in the Balsam Variation Area and would be within the entire length (approximately 5.5 miles) of the Proposed Blue Route in the Blackberry Variation Area. The building within the plant site would be located approximately 300 feet from the anticipated alignment of the Proposed Blue/Orange Route in the Balsam Variation Area (Map 7-1).

7.2.2.2 Nashwauk Public Utilities Commission 230 kV Transmission Line

Under an agreement with the Nashwauk Public Utilities Commission, Minnesota Power previously constructed three of four 230 kV transmission lines and two 230 kV substations to supply electric power to an Essar Steel Minnesota project. A fourth transmission line has been permitted by the MN PUC but has not yet been constructed. This potential fourth transmission line would begin at the existing Minnesota Power 230 kV Blackberry Substation (Township 55 North, Range 23 West, Section 19) and continue northeast and parallel two existing Minnesota Power 115 kV transmission lines (the 63 Line and the 62 Line), terminating at the Essar Steel Minnesota project (Map 7-1).

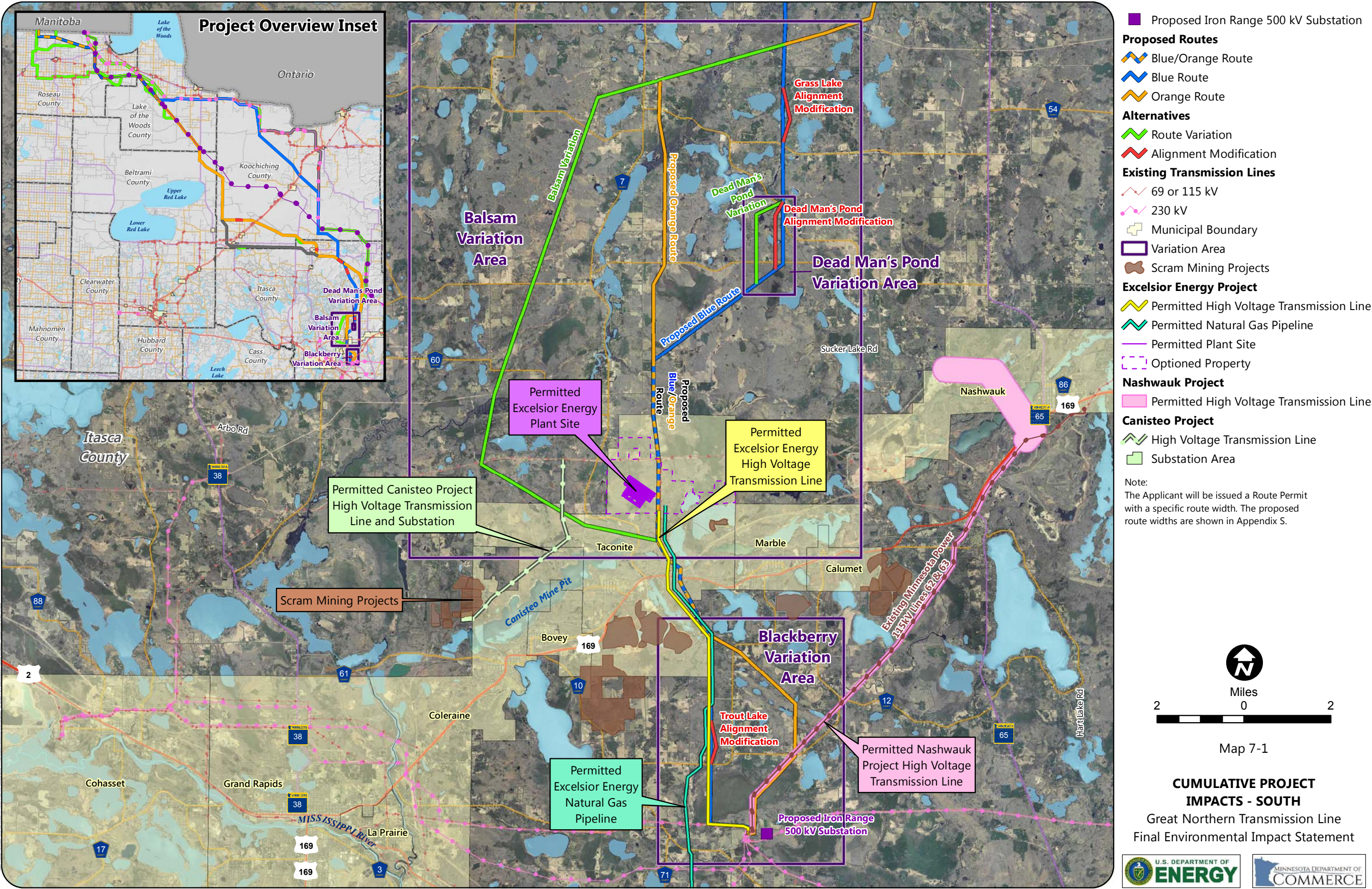
According to the MN PUC route permit (MN PUC 2010, reference (193)), if this proposed fourth transmission line to the Essar Steel Minnesota project is built, the existing 62 line, located west of

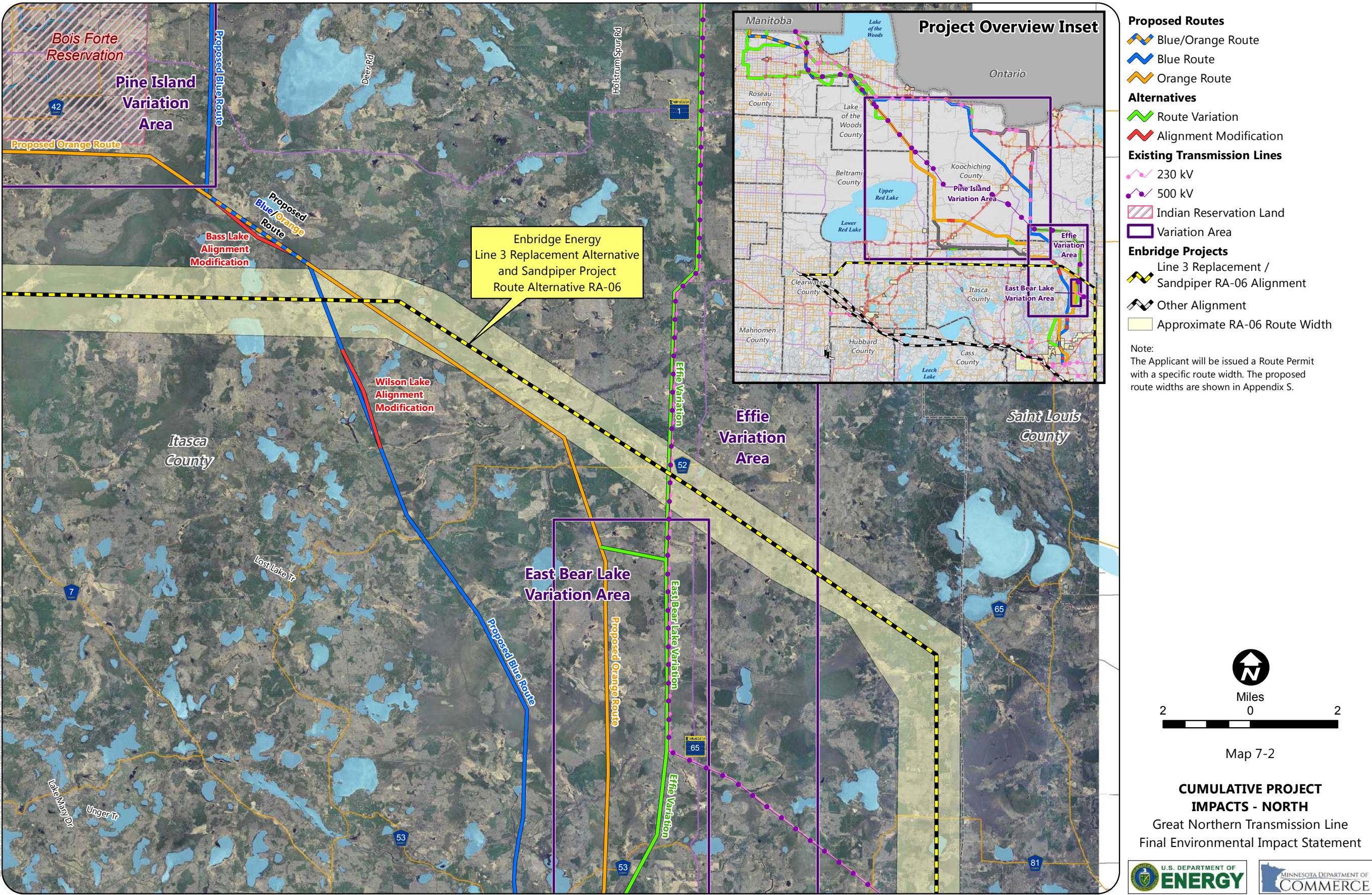
⁸⁷ Available at: <http://mn.gov/commerce/energyfacilities/Docket.html> Reviewed on March 25, 2015 for open projects permitted since January 1, 2010

⁸⁸ Available at: <http://mn.gov/commerce/energyfacilities/Docket.html?Id=33599#edocketFiles>

⁸⁹ Available at: [http://mn.gov/commerce/energyfacilities/documents/16573/Combined%20Order%20and%20Permits%20\(signed\).pdf](http://mn.gov/commerce/energyfacilities/documents/16573/Combined%20Order%20and%20Permits%20(signed).pdf)

⁹⁰ Available at: [http://mn.gov/commerce/energyfacilities/documents/16573/Excelsior%20Request%20on%20Natural%20Gas%20Conversion%20\(5-31-12\).pdf](http://mn.gov/commerce/energyfacilities/documents/16573/Excelsior%20Request%20on%20Natural%20Gas%20Conversion%20(5-31-12).pdf)





the 63 Line, would be dismantled (Map 7-1). The potential fourth 230 kV transmission line would then be constructed within the former 62 Line ROW and would not result in the creation of a new ROW.

The portion of the permitted route for this potential fourth 230 kV transmission line that would parallel the Proposed Orange Route would be two miles in length, and located within the area between the existing Blackberry Substation and near the north end of Little Sand Lake (Map 7-1).

7.2.2.3 Proposed Oil Pipeline Projects

The MN PUC has included numerous potential routes for the proposed Enbridge Sandpiper pipeline project for detailed study as part of the Route Permit process for that project (Minnesota Department of Commerce, reference (194)). One of these route (RA-06) crosses the Proposed Blue Route, Proposed Orange Route, and the Effie Variation in the Effie Variation Area (Map 7-2). As proposed, the Enbridge Line 3 project would also follow the same route as the proposed Enbridge Sandpiper project from the Clearbrook terminal to the Superior terminal; crossing the proposed Project in the same locations as the Enbridge Sandpiper pipeline project. Both of these pipelines would be located underground.

7.2.2.4 Scram Mining

There are also areas where iron ore is currently mined or permits have been issued for new mines in which the ore is extracted from previously developed stockpiles, basins, underground workings, or open pits. The currently active areas of so-called “scram” mining are located near the west side of the Canisteo Pit, approximately four to six miles west of the proposed routes and variations (Map 7-1). The Balsam Variation, which is in the Balsam Variation Area, would cross the permitted Canisteo 115 kV transmission line recently constructed specifically to serve one of these scram mining facilities. **The Balsam Variation would also cross known mineral resources leased from the MnDNR and would potentially encumber the lease.** The anticipated alignment for all other proposed routes and variations are located more than 2,000 feet from existing or proposed scram mining facilities in the area.

7.3 Cumulative Impacts

In addition to temporal factors, the potential for cumulative impacts also depends on spatial factors within the environment, which can vary for the resources evaluated in this EIS. For example, the

geographic area of consideration for cumulative impacts could be limited to the discrete area of disturbance for vegetation resources but also include all vantage points for visual resources. The geographic ROI for cumulative impacts includes the areas in which the proposed Project and reasonably foreseeable future actions—which are identified in Section 7.2.2—directly and indirectly impact resources, and corresponds to the ROIs described in Chapter 5 and Chapter 6.

Cumulative impacts analysis must be conducted within the context of the resources evaluated in this EIS. The magnitude and context of the effect on a resource depends on whether the cumulative effects exceed the capacity of a resource to sustain itself and remain productive (CEQ 1997, reference (195)). If cumulative impacts are expected to exceed these thresholds, they would be considered significant.

The international border crossing alternatives discussed in Section 5.2, Section 5.3, and Section 6.2.1 do not have any reasonably foreseeable future projects located within their ROI that are expected to result in any cumulative impacts.

7.3.1 Human Settlement

This section describes potential cumulative impacts to human settlement resources discussed in Chapter 5 and Chapter 6.

7.3.1.1 Aesthetics

As discussed in Section 5.3.1.1, construction of the proposed Project would result in visual impacts. Short-term aesthetic impacts during construction would be temporary and are expected to be restored to pre-existing conditions upon completion of construction. If any of the reasonably foreseeable projects are constructed at the same time as the proposed Project, these temporary effects would be exacerbated during concurrent construction phases but their short-term nature would mean these adverse impacts are not expected to be significant.

The ROI for long-term impacts on aesthetics is 1,500 feet on either side of the anticipated alignment of the proposed routes and variations and within 1,500 feet from the footprint of the proposed **Iron Range** 500 kV Substation, 500 kV Series Compensation Station, regeneration stations, permanent and temporary access roads, temporary laydown areas, temporary stringing areas, and temporary fly-in sites. The 1,500 foot ROI for aesthetic resources was identified because the proposed Project is most likely to be visible within this near-foreground distance zone and views of the proposed Project

from aesthetic resources within this distance zone have the greatest potential to result in visual impacts for sensitive viewers.

Although many of the aesthetic impacts of the proposed Project would be short-term during construction, the presence of transmission structures in the landscape and clearing the ROW of trees would result in a long-term change in local aesthetics. In addition, utilities paralleling existing corridors can cumulatively create wide, long areas of visual disturbance. The reasonably foreseeable future transmission line projects listed in 7.2.2 are all in the Balsam and Blackberry variation areas where there are more population centers, infrastructure, and mining activity. The Sandpiper Pipeline RA-06 route, if selected, and the Enbridge Line 3 project would intersect the Proposed Blue/Orange Route, but would be located underground and would cross the 200-foot ROW for the proposed Project. The potential cumulative aesthetic impacts in this area are not expected to be significant because they would only involve paralleling transmission lines for approximately nine miles, and this infrastructure would not be incompatible with existing conditions.

7.3.1.2 Land Use Compatibility

The ROI for land use includes land within 1,500 feet on either side of the anticipated alignment of the proposed routes and variations and within 1,500 feet of the footprint of the proposed **Iron Range** 500 kV Substation, 500 kV Series Compensation Station, regeneration stations, permanent and temporary access roads, temporary laydown areas, temporary stringing areas, and temporary fly-in sites. This ROI includes the 200-foot ROW and adjacent lands that would be impacted by construction and operation of the proposed Project.

All of the reasonably foreseeable future projects would be required to be developed in compliance with local zoning, floodplain ordinances, and land management plans. As such, considered together, these reasonably foreseeable future projects would be expected to be consistent with planned land uses and no cumulative impacts on land-use compatibility would be expected. The Applicant will need to consult with applicable land management agencies and entities to ensure this compatibility.

7.3.1.3 Cultural Values

The ROI for impacts to cultural values includes the counties crossed by each of the proposed routes and variations. The proposed Project is not expected to have the potential to impact cultural values outside these areas. The cumulative impacts of the reasonably foreseeable future projects listed in

Section 7.2.2 all occur in the general region of the Iron Range, which over the last century has been characterized by communities that developed as a result of the iron and taconite mining industry on the Mesabi Iron Range. The potential impacts from the reasonably foreseeable future projects on these values are not expected to be measurable. Impacts on cultural values in the West, Central, and East Sections due to past projects and the proposed Project are described in Section 5.3.1.

7.3.1.4 Displacement

The ROI for displacement is the 200-foot ROW of the proposed routes and variations since structures within the ROW would need to be removed for construction and operation of the proposed Project. The reasonably foreseeable future transmission line projects would run parallel in the Balsam and Blackberry variation areas. There are no residences in the Proposed Blue Route ROW or the Proposed Orange Route ROW in both the Balsam Variation Area and the Blackberry Variation Area. There are also no residences in the ROW of the Balsam Variation within the Balsam Variation Area. In these locations, all residences are more than 210 feet from any proposed ROW. Because none of the reasonably foreseeable future projects listed in 7.2.2 have residences within any of the potential ROWs, no displacement is anticipated from the proposed Project.

7.3.1.5 Noise

The ROI for noise includes receptors within a 1,500-foot on either side of the anticipated alignment of the proposed routes and variations, **proposed Iron Range** 500 kV Substation site, the 500 kV Series Compensation Station, regeneration stations, permanent and temporary access roads, temporary laydown areas, temporary stringing areas, and temporary fly-in sites. Since construction areas and access roads may be located anywhere within or outside of the ROW and not necessarily only at the proposed centerline, a conservative radius of 1,500 feet from the proposed Project noise sources has been selected to assess the potential impacts of noise from the project on existing sensitive receptors. The attenuation of noise with distance results in a decrease in noise with distance. Typically, a radius of 1,325 to 1,500 feet is used while evaluating potential community noise impacts (Section 5.2.1.2). If all of reasonably foreseeable future projects were constructed at the same time, there would be an expected short-term increase in noise disturbance.

7.3.1.6 Air Quality, Greenhouse Gas Emissions, and Climate Change

The ROI for air quality includes the counties of Roseau, Lake of the Woods, Beltrami, Koochiching, and Itasca because compliance with the national and state air quality standards in the State of Minnesota is assessed at the county level. United States (U.S.) Environmental Protection Agency (EPA) designates all of the counties in the ROI to be in attainment or unclassifiable (to be considered in attainment) for all National Ambient Air Quality Standards (NAAQS) (EPA 2015, reference (2)).

As discussed in Section 5.2.1.3, the construction activities for the proposed Project would generate criteria pollutant emissions; these emissions would be localized to the area of the proposed Project and occur in the short-term time frame of construction. Each of the reasonably foreseeable future projects listed in Section 7.2.2 would also involve construction activities with associated short-term emissions. If the large electric power generating plant for the Mesaba Energy project were built, it would result in long-term emissions from operations. None of the reasonably foreseeable future projects individually⁹¹ or cumulatively are expected to contribute to significant air emission impacts because the projects would be in attainment for all NAAQS.

7.3.1.7 Property Values

The ROI for property values is 1,500 feet on either side of the anticipated alignment of the proposed routes and variations and within 1,500 feet the permanent footprint of the other elements of the proposed Project including the proposed **Iron Range** 500 kV Substation, 500 kV Series Compensation Station, regeneration stations and permanent access roads). This is the same ROI used in the analysis of the factors (Aesthetics, EMFs, and Agriculture) that can influence property value impacts. The Sandpiper pipeline RA-06 route, if selected, and the Enbridge Line 3 project would intersect the alternatives for this proposed Project, but only underground and for the short distance needed to cross the 200-foot ROW. The Excelsior Energy and Nashwauk transmission line projects would both parallel existing transmission line corridors. Therefore, the impact of either of these two reasonably foreseeable future projects on property values in the ROI would be minimal because there is already an existing transmission lines in both of the proposed corridors.

7.3.1.8 Electronic Interference

The ROI for electronic interference is 1,500 feet on either side of the anticipated alignment of the proposed routes and variations. This ROI was selected because it incorporates direct impacts that could result if communication towers are near the transmission line and could be impacted by the transmission line structures and corona effects as described in Section 5.2.1.5.

The reasonably foreseeable future projects listed in Section 7.2.2 could result in paralleling corridors for several electric transmission lines and two pipelines. The only cumulative impact these projects could produce would be line-of-sight interference with communications. Should this occur, it could be remedied during final design by moving the receiving antenna or other communication device or positioning the transmission line structure so it does not cause line-of-sight interference.

7.3.1.9 Transportation and Public Services

The reasonably foreseeable future projects listed in Section 7.2.2 would not be expected to impact transportation or public services. There would be increased construction vehicle traffic if all reasonably foreseeable future projects were constructed at the same time, but this impact would result in short-term, adverse traffic impacts. The MN PUC Route Permit would require the Applicant to comply with MDOT and all applicable road authorities' management standards and policies during construction. For example, the Route Permit would direct the Applicant to provide written notice of construction to MnDOT and applicable city, township, and county road authorities to coordinate local traffic concerns. The Applicant has also committed to implement traffic control measures in accordance with the MnDOT Manual on Uniform Traffic Control Devices. (MnDOT 2014, reference (196)).

7.3.1.10 Environmental Justice

The ROI for environmental justice comprises all the census tracts intersected by the 200-foot ROWs of the proposed routes and variations. Potential cumulative impacts on environmental justice could occur due to the proximity of the reasonably foreseeable future projects to low-income and minority populations, which could result in disproportionately high and adverse human health or environmental effects on those populations. If low-income and minority populations live near the projects, then construction and operation of the proposed Project and reasonably foreseeable future projects could subject those populations to

⁹¹ The Mesaba Energy project is now expected to be a combined-cycle natural gas plant.

disproportionate impacts due to adverse impacts to air quality, socioeconomics, transportation, and public service, EMFs, implantable medical devices, stray voltage, induced voltage, and subsistence. However, since there is a low percentage of minority and low-income populations in the project area (Section 5.2.1.7), these populations would not be disproportionately affected by the proposed Project, variations, or the reasonably foreseeable projects).

7.3.1.11 Socioeconomics

The ROI for socioeconomic impacts includes the counties intersected by the proposed routes and variations. From north to south, the ROI includes the counties of Roseau, Lake of the Woods, Beltrami, Koochiching, and Itasca as the majority of potential socioeconomic effects from the proposed Project would occur in these counties.

If all the reasonably foreseeable future projects listed in Section 7.2.2 were constructed at the same time, there would be a cumulative socioeconomic benefit, primarily in the form of short-term construction employment and long-term revenue from taxes. A complete analysis of socioeconomics for the proposed Project can be found in Section 5.2.1.8. During construction, an average of 120 construction workers would be employed annually during the construction period from 2017 through 2020. In the peak year of construction, the proposed Project would directly employ approximately 213 workers (University of Minnesota-Duluth 2013, reference (36)). Along with these construction jobs, tax revenues, gross output, and value-added spending (reported in 2013 dollars) would occur from development and construction of the proposed Project. During the five-year construction phase, the proposed Project would generate approximately \$26.5 million dollars in state and local taxes through compensation, business, household, and corporation taxes. Combined with taxes paid at the state and local level during the development (pre-construction) phase, the total state and local taxes would be approximately \$28 million (University of Minnesota-Duluth 2013, reference (36)).

The Mesaba Energy project, if constructed, would also contribute to significant increases in construction jobs for Itasca County and the entire Arrowhead Region. The EIS for the Mesaba Energy project predicted that during the peak construction year, approximately 1,600 direct construction jobs would be created in the region, including those jobs which provide goods and services for the project. Another 955 new jobs in numerous industries were estimated to be induced by the Mesaba Energy

project through increased consumer spending. No estimates of construction or operation phase jobs for a natural gas combined cycle facility (without coal gasification) are currently available for the Mesaba Energy project. The Enbridge Sandpiper pipeline project and the Enbridge Line 3 project would also create new employment during construction in the area, and could contribute to a temporary housing shortage in the area all these projects were to be constructed at the same time. Because Grand Rapids is within commuting distance of the construction area of these reasonably foreseeable future projects, any housing shortage would not be expected to be significant.

Along with the cumulative socioeconomic impacts from the Mesaba Energy project and the pipeline projects, there are socioeconomic implications of the proposed Project's potential effect on the regional electric grid. The Midcontinent Independent System Operators (MISO) published a study, the MISO Manitoba Hydro Wind Synergy Study, which analyzed a new 500 kV interconnection with Manitoba. (Table 5.7 of MISO 2013, reference (197)). The study concluded that such a connection would provide "significant benefits" to the entire MISO footprint, including substantial reductions in wind curtailments and better utilization of both wind and hydro resources, meaning increased efficiency of the energy supply system as a whole. Over a 20-year timeframe, these benefits were valued at approximately \$1.6 billion in 2012 dollars for the northern MISO region.

7.3.1.12 Recreation and Tourism

The ROI for impacts to recreation includes county, state, and federal parks and forests, state SNAs, state trails, scenic byways, and snowmobile and water trails that are located within 1,500 feet on either side of the anticipated alignment of the proposed routes and variations and within 1,500 feet of the footprint of the other elements of the proposed Project including the proposed **Iron Range** 500 kV Substation, 500 kV Series Compensation Station, regeneration stations, permanent and temporary access roads, temporary laydown areas, temporary stringing areas, and temporary fly-in sites. This ROI was identified because recreation features within these areas are most likely to experience direct or indirect impacts from the proposed Project.

If all the reasonably foreseeable future projects listed in Section 7.2.2 were constructed there could be cumulative long-term indirect visual impacts, primarily to recreational boaters at lakes in Itasca County, who could see additional transmission line structures where they could be located in parallel

corridors in the vicinity of South Twin Lakes and Loon Lakes in the Blackberry Variation Area, as well as in the vicinity of O'Reilly Lake in the Balsam Variation Area. This impact is not expected to have a measureable effect on recreation and tourism, however, because the additional infrastructure would be constructed parallel to the same corridor as a section of the proposed Project. A second transmission line paralleling the same corridor as the proposed Project would have only a small incremental impact on the view from these recreation areas.

7.3.2 Public Health and Safety

This section describes potential cumulative impacts to public health and safety resources discussed in Chapter 5 and Chapter 6.

7.3.2.1 Electric and Magnetic Fields

The ROI for EMF includes a 600-foot buffer (300 feet on either side of the anticipated alignment) along the proposed routes and variations within the West, Central, East sections, as well as the proposed **Iron Range** 500 kV Substation, 500 kV Series Compensation Station, and regeneration stations. When the proposed transmission line routes are collocated with existing transmission lines, the ROI has been expanded to a buffer of 800 feet wide (400 feet from the proposed transmission line centerline). The ROI was determined based on standard methodologies for EMF measuring and modeling that account for standard attenuation distances for these fields.

If all reasonably foreseeable future projects listed in Section 7.2.2 were constructed, it would result in paralleling of multiple electric transmission lines and an increase in electric and magnetic fields. The cumulative effects from this paralleling would be similar to the levels listed in Section 5.2.2.1 which would be below state standards for electric fields and other state and international standards on magnetic fields, therefore, potential cumulative impacts from EMFs on public health are not expected to be significant.

7.3.2.2 Implantable Medical Devices

As discussed above on EMFs, cumulative impacts from all reasonably foreseeable future projects listed in Section 7.2.2 would result in an increase in electric fields, but this cumulative increase would result in levels below state standards and is not expected to affect implantable medical devices.

7.3.2.3 Stray Voltage

The ROI for this analysis of stray voltage includes the 200-foot ROW for the proposed routes and variations within the West, Central, East sections, as well as the proposed **Iron Range** 500 kV Substation, 500 kV Series Compensation Station, and regeneration stations. Similar to implantable medical devices, the cumulative impacts from all projects listed in Section 7.2.2 combined with the proposed Project would not be expected to have any measurable impacts from stray voltage, even on agricultural operations.

7.3.2.4 Induced Voltage

The ROI for induced voltage includes the 200-foot ROW for the proposed routes and variations within the West, Central, East sections, as well as the proposed **Iron Range** 500 kV Substation, 500 kV Series Compensation Station, and regeneration stations. As with stray voltage, the cumulative result of all projects listed in Section 7.2.2 in combination with the proposed Project would not be expected to result in measureable increases in induced voltage. The combination of transmission lines located in parallel corridors would increase the potential for minor shocks to occur to individuals touching an ungrounded object, such as machinery, while standing directly underneath one of these lines. Adherence to best management practices (BMPs) and safety measures would avoid this impact.

7.3.2.5 Intentional Destructive Acts

The ROI for intentional destructive acts includes the 200-foot ROW for the proposed routes and variations within the West, Central, East sections, as well as the proposed **Iron Range** 500 kV Substation, 500 kV Series Compensation Station, and regeneration stations. If the Mesaba Energy project, the Nashwauk transmission line from the Blackberry to Nashwauk, or both were constructed, they would all connect into the existing Blackberry Substation.

7.3.2.6 Environmental Contamination

The ROI for environmental contamination includes environmental contamination sites within 2,000 feet (1000-feet on either side) of the anticipated alignment of the proposed routes and variations and proposed **Iron Range** 500 kV Substation, 500 kV Series Compensation Station, and regeneration stations. Construction and maintenance of any transmission line involves the use of hazardous materials and the generation of waste. If handled improperly, the public and/or the surrounding environment could be adversely affected. For all the proposed routes and variations, soil would be

disturbed and, as a result, any existing contaminated soil or groundwater could be mobilized. In this case, a 2,000-foot radius was used to be conservative and to gain a comprehensive view of the potential for contamination near the proposed routes and variations. While the construction of all reasonably foreseeable future projects would increase the potential for environmental contamination through spills or excavation of contaminated sites, the adherence to BMPs would avoid these impacts.

7.3.2.7 Worker Health and Safety Considerations

While construction activity of all reasonably foreseeable future projects would increase the potential for health and safety concerns, compliance with Occupational Safety and Health Administration (OSHA) requirements would help to avoid or minimize these impacts.

7.3.3 Land-Based Economies

This section describes potential cumulative impacts from the constructions of all reasonably foreseeable future projects to land-based economic resources discussed in Chapter 6, specifically agriculture, forestry, and mining and mineral resources.

7.3.3.1 Agriculture

The ROI for agriculture includes the 200-foot ROW of the proposed routes and variations and the footprint of the other elements of the proposed Project including permanent access roads and the proposed **Iron Range** 500 kV Substation, 500 kV Series Compensation Station, and regeneration stations.

As discussed in Section 5.3.2.1, construction of the proposed Project could result in impacts to agricultural operations and practices. The proposed Project, in combination with reasonably foreseeable future projects could cause cumulative impacts to agriculture as operations and practices which may need to be altered (e.g., row cropping around individual transmission structures) in certain areas to avoid conflicts with utilities. These cumulative impacts to agriculture would only occur in the Balsam and Blackberry variation areas, and since farmland is not common in these variation areas, adverse cumulative impacts are expected to be minimal.

7.3.3.2 Forestry

The ROI for forestry includes the 200-foot ROW of the proposed routes and variations and the footprint of the proposed **Iron Range** 500 kV Substation, 500 kV Series Compensation Station, regeneration stations, permanent and temporary

access roads, temporary laydown areas, temporary stringing areas, and temporary fly-in sites.

The proposed Project, in addition to the reasonably foreseeable future projects listed in 7.2.2, could collectively result in adverse, localized cumulative impacts to forestry and timber operations by removing the lands in ROWs from active timber production or forestry activity. The cumulative impacts associated with the reasonably foreseeable future projects listed in Section 7.2.2, would be limited to the southern portion of the Balsam Variation Area and the Blackberry Variation Area, where forested land is dominant, so the cumulative impacts from these projects are likely to be a small percentage of the forested area. Therefore, cumulative impacts to forestry and timber operations are expected to be minimal.

7.3.3.3 Mining and Mineral Resources

The ROI for mining and mineral resources includes the 200-foot ROW of the proposed routes and variations, permanent and temporary access roads, and the footprint of the proposed **Iron Range** 500 kV Substation, 500 kV Series Compensation Station, regeneration stations, temporary laydown areas, temporary stringing areas, and temporary fly-in sites.

Potential cumulative impacts on mining and mineral resources could occur if multiple projects that interfere with access to mineable resources or the ability to remove mineral resources are constructed in close proximity to or at the same time as one another. If there is a conflict between transmission lines and mineral rights, the transmission lines may have to be relocated to access the underground minerals.

The Proposed Blue Route, and the transmission line and pipeline routes for the Mesaba Energy project all cross one area of known mineral resources in the north portion of the Blackberry Variation Area. Route RA-06 for the Enbridge Sandpiper pipeline project and the Enbridge Line 3 project also would cross through areas with known mineral resources. If the Mesaba Energy project, the Enbridge Sandpiper pipeline project, and the Enbridge Line 3 project were eventually constructed in this area, portions of one or all of these projects may need to be relocated in the future in order to protect access to mineral resources.

7.3.4 Archaeology and Historic Resources

As discussed in Section 5.3.3.2, transmission line construction can result in damage, destruction, or alteration of historic buildings and buried archaeological resources. A Programmatic

Agreement (PA) is under development by Department of Energy (DOE), Tribes, Minnesota State Historical and Preservation Office (SHPO), Advisory Council on Historic Preservation (ACHP), the Applicant, and other consulting parties to avoid and minimize impacts to cultural resources (**Appendix V**).

Adverse cumulative effects on cultural resources may occur if ground disturbance associated with the proposed Project and other present and reasonably foreseeable projects directly destroy or damage archaeological resources, disturb the context of archaeological resources, or affect an NRHP-eligible architectural resource.

The ROI for cumulative effects assessment to archaeological resources includes the 200-foot ROW of the proposed routes and variations and the permanent and temporary access roads as well as the footprint of the proposed **Iron Range** 500 kV Substation, 500 kV Series Compensation Station, regeneration stations, temporary laydown areas, temporary stringing areas, and temporary fly-in sites. For architectural resources, the ROI (which is the same as the Area of Potential Effect (APE)) includes the 200-foot ROW width plus the distance of a one-mile radius from the anticipated alignment of the proposed routes and variations. The additional one-mile ROI for architectural resources serves to address the potential adverse effects the proposed Project could have upon historic viewsheds, adjacent historic architectural resources, and cultural landscapes because visual intrusions can have a direct effect on the context and setting of historic architectural properties.

If the proposed Project parallels other transmission line corridors and is within the viewshed of historic architectural or built resources in the indirect APE, as defined in Section 5.3.3.1, it could have indirect, cumulative adverse visual effects on those structures if these historic architectural or built resources are determined NRHP-eligible and if setting is determined to be a character defining feature that contributes to the significance of the resource. One area where this could happen is along the Proposed Blue Route and Proposed Orange Route in the Balsam Variation Area where the proposed Project would parallel the transmission line associated with the proposed Excelsior Energy Mesaba Energy power plant. Specifically, these projects would be located in the municipality of Taconite where several historic architectural sites that have either not been evaluated or were recommended potentially NRHP eligible, recommended NRHP eligible, or considered NRHP eligible are located (Map 6-62). It is currently unknown whether the setting of any of these historic

architectural sites contributes to the significance of the resource and therefore whether it would be an adverse effect to the resource. The Enbridge Sandpiper pipeline RA-06 route, if selected, and the Enbridge Line 3 project would intersect the alternatives for this proposed Project, but would be underground and would cross the route of the proposed Project for only the 200-foot ROW and would therefore not visually impact historic resources.

Indirect, long-term, adverse visual effects on these architectural resources within the indirect APE are likely to occur wherever the transmission structures associated with the reasonably foreseeable future projects are visibly prominent and appear inconsistent with the existing setting of the architectural resources or within views to and from the architectural resources. However, since this is a developed area, none of the reasonably foreseeable future projects are expected to be inconsistent with existing settings or views surrounding architectural resources. As such, these impacts would not be expected to be significant.

7.3.5 Natural Resources

This section describes potential cumulative impacts to natural resources discussed in Chapter 6 specifically water, vegetation, and wildlife resources. The ROI for impacts to water resources, vegetation, and general wildlife (not threatened or endangered species) is the 200-foot ROW of the proposed routes and variations, permanent and temporary access roads, and the footprint of the proposed **Iron Range** 500 kV Substation, 500 kV Series Compensation Station, regeneration stations, temporary laydown areas, temporary stringing areas, and temporary fly-in sites. This ROI was selected based on the expectation that, given the construction activities proposed and associated Applicant measures to avoid, minimize, and mitigate potential impacts, any impacts to water resources would likely occur within this area.

7.3.5.1 Water Resources

The proposed Project, in addition to the reasonably foreseeable future projects listed in Section 7.2.2, would collectively result in adverse, regional cumulative impacts to wetlands. Linear projects, such as transmission lines and pipelines, require removal of woody vegetation from the project ROWs for construction and operation. Should woody vegetation be removed from forested and/or shrub wetlands, it would convert the wetland to a different vegetation community and wetland type.

When considered collectively, the proposed Project in combination with present and reasonably foreseeable projects would be expected to cumulatively result in a conversion of wetland vegetation community and wetland type; however, these impacts are not anticipated to be significant due to the amount of surrounding shrub and forested wetlands in the region.

Total wetland acreage within the region was calculated within eight-digit hydrologic unit code watersheds that overlap the proposed Project and any of the reasonably foreseeable projects. Watersheds used in this analysis include Little Fork, Prairie-Willow, Red Lakes, Big Fork, Rapid, Two Rivers, Lower Rainy, Roseau, and Lake of the Woods and were limited to portions of the watersheds within the United States to match the extents of available NWI data. Based on NWI data, there are approximately 4,609,000 acres of wetland in the region; of this, approximately 3,384,000 million (73.4 percent) are forested or shrub wetland.

Potential cumulative wetland impacts were determined based on conversion of forested or shrub wetland to herbaceous wetland types within a 200-foot ROW for all reasonably foreseeable future linear projects or within the project footprint for non-linear projects. The proposed Project, in combination with all reasonably foreseeable future projects, would result in the conversion of 0.12 percent of NWI-determined forested or shrub wetland in the region to an herbaceous wetland type. This quantity of potential wetland conversion is not expected to be significant in the context of the region.

The long-term impacts associated with vegetation removal and subsequent vegetation maintenance of the ROWs of all reasonably foreseeable future projects could result in adverse cumulative impacts to wetland hydrology, vegetation composition, and wetland function; however, these impacts are not expected to be significant due to the amount of surrounding shrub and forested wetlands in the region. The Applicant for the proposed Project and other reasonably foreseeable future project proponents would likely need to mitigate wetland impacts as part of permit negotiations with USACE for their individual project (40 CFR 332.3).

7.3.5.2 Vegetation

Potential cumulative impacts on vegetation resources could occur if multiple projects are constructed in close proximity of one another. The clearing of vegetation and conversion from forested to open habitats could impede native vegetation by

increasing potential for spread of invasive species and noxious weeds and could also increase the effects of light penetration, wind, and humidity that is more prominent on edges between different habitat types. Projects may also permanently remove vegetation to place structures, permanent access roads, etc. Clearing of low-growing vegetation during construction is not anticipated to result in a significant cumulative impact as it would be expected that disturbed areas would be reseeded upon completion of construction. However, permanent removal of trees and shrubs along project ROWs could result in significant cumulative effects if these projects are constructed in close proximity to one another and do not minimize impacts through paralleling existing corridors.

7.3.5.3 Wildlife

Cumulative impacts for wildlife resources would be different from construction and operation activities of the transmission line. During construction of the proposed Project, wildlife could be affected by actual vegetation clearing or ground disturbance within the proposed Project footprints, as well as through the alteration of habitats following construction, as discussed in Section 5.3.4.3.

The proposed Project could result in cumulative impacts to wildlife resources when considered together with the other projects listed in 7.2.2 if those projects are constructed concurrently in close proximity. Specifically, the clearing of vegetation and disturbance of wildlife habitats could physically harm or displace wildlife species. In addition, impacts such as disturbance related to construction noise could occur. For non-listed wildlife species, these impacts would not be expected to be significant because these species do not suffer from population level declines.

Even if not constructed concurrently, these reasonably foreseeable future projects could further alter the amount and quality of habitat available to wildlife in the vicinity of the proposed Project due to tree clearing for ROWs for transmission lines and a pipeline and the facility footprint for the Mesaba Energy power plant. These reasonably foreseeable future projects are in parallel corridors for approximately nine miles with the Proposed Project; so while these impacts would be long-term, their localized nature and the availability of abundant forested habitat in the vicinity mean that these impacts would not be expected to be significant.

Operations of the reasonably foreseeable future transmission line projects in 7.2.2 could have a greater cumulative impact on avian species

through collisions and electrocutions, as discussed in Section 5.3.4.3. These cumulative impacts are not expected to be significant, though, due to the isolated nature of these impacts and the Applicant proposed measures to reduce impacts to avian species from transmission lines, which are summarized in Chapter 2.

7.3.6 Rare and Unique Natural Resources

This section describes potential cumulative impacts to rare and unique natural resources discussed in Chapter 6, specifically rare species and rare communities. The ROI for rare and unique natural resources varies by species. The ROI for federally listed species under the Endangered Species Act (ESA) includes the county for which each species is listed. Because no formal surveys for state-listed species have been conducted for the proposed Project, the ROI for state-listed species includes a one-mile buffer on either side of the anticipated alignment for the proposed routes and variations in order to obtain a broad view of species that may be present across the project. The ROI for rare plant communities includes the 200-foot ROW of the proposed transmission line and the permanent and temporary access roads in addition to the footprint of the other elements of the proposed Project: the **Iron Range** 500 kV Substation, 500 kV Series Compensation Station, regeneration stations, temporary laydown areas, temporary stringing areas, and temporary fly-in sites. These ROIs were selected based on the expectation that the majority of rare and unique natural resource impacts would likely occur due to construction and on-going transmission line operation within these areas.

7.3.6.1 Rare Species

Potential cumulative impacts to rare wildlife species could occur during construction of multiple projects that are constructed concurrently in close proximity and are similar to those described for non-listed species in Section 7.3.5.3. If cumulative effects associated with construction or operation of the proposed Project could occur to federally or state-listed species, then the potential for cumulative adverse effects could be significant.

The proposed Project, when considered with any other reasonably foreseeable future project that may involve tree removal, could contribute to cumulative impacts to the northern long-eared bat, which relies on forested habitat for roosting. If trees are cleared during the roosting period or if trees are cleared within close proximity to one another, cumulative impacts to the northern long-eared bat and its roosting habitat could be significant. A Biological

Assessment is being prepared and consultation with the U.S. Fish and Wildlife Service (USFWS) is ongoing. Avoidance, minimization, and mitigation measures for federally listed species will need to be coordinated with the USFWS in compliance with the ESA.

If rare species are located in disturbed areas of projects constructed in close proximity of one another, the cumulative impacts could be detrimental to individual rare communities; however, field surveys would be required to confirm the presence of rare species in the respective project areas prior to construction. If species are found, the Applicant would coordinate with USFWS or Minnesota Department of Natural Resources (MnDNR) regarding avoidance or mitigation. Some rare species frequently colonize disturbed areas and could benefit from new habitat created as a result of ground disturbance from multiple projects (see Section 5.3.5.2 for additional information).

7.3.6.2 Rare Communities

Potential cumulative impacts on rare communities could occur if multiple projects are constructed in close proximity of one another and are similar to those described for vegetation in Section 7.3.5.2. Permanent loss of forest would lead to fragmentation by reducing intact blocks of forest vegetation. Removal of vegetation and conversion to open habitats would increase the potential for spread of invasive species and would alter the structure and function of rare communities, potentially making them less suitable for the rare species that would typically inhabit them. Cumulative impacts to rare communities could be significant if projects are constructed in close proximity to one another and disturbance is not minimized by paralleling existing corridors.

7.4 Adverse Impacts that Cannot be Avoided

Adverse impacts would be minimized with implementation of the Applicant-proposed measures described in Section 2.13. Where feasible, this EIS suggests additional measures (mitigation) would be incorporated into the planning, design and construction of the proposed Project to substantially eliminate the adverse impacts where possible. For some impacts, adverse impacts can be reduced but not eliminated and are therefore determined to be unavoidable. Most unavoidable adverse impacts would occur during the construction phase of the proposed Project and would be temporary.

A review of impacts and possible mitigation measures is located in Chapter 5 in this EIS; the unavoidable adverse effects caused by the proposed Project that would remain after applying mitigation measures are discussed in Chapter 6.

Unavoidable adverse effects related to the proposed Project construction would last only as long as the construction period, and would include:

- Soil compaction, erosion, and vegetation degradation;
- Disturbance to and displacement of some species of wildlife;
- Disturbance to nearby residents;
- Traffic delays in some areas; and
- Minor air quality impacts due to fugitive dust.

Unavoidable adverse effects related to the proposed Project that would last at least as long as the life of the proposed Project would include:

- The addition to the visual landscape of transmission structures and lines;
- Habitat type changes and fragmentation;
- Adverse impacts to wildlife and wildlife habitat due to project-related changes to wetland type (palustrine forested (PFO) and palustrine shrub (PSS) to palustrine emergent (PEM)) and the removal of other vegetation; and
- Direct adverse impacts to wildlife as a result of avian collisions.

EMFs from the proposed Project are also unavoidable. Further details of these impacts are discussed in Section 5.2.2.1.

7.5 Relationship between Short-term uses of the Environment and the Maintenance and Enhancement of Long-term Productivity

Short-term uses of the biophysical components of the human environment include impacts, usually related to construction activities, which occur over a period of less than five years. Long-term uses of the human environment include those impacts that occur over a period of more than five years, including permanent resource losses.

Chapter 5 identifies potential short-term, adverse impacts on the natural environment as a result of construction activities. These adverse impacts

include increases in surface water turbidity; disturbance and re-suspension of sediments in surface waters; vegetation clearing; localized habitat degradation; soil disturbance and increased potential for erosion; stormwater runoff into surface water; and increased traffic, air emissions, and noise. Long-term adverse impacts of the proposed Project include wetland vegetation community and wetland type conversion through clearing of woody vegetation in the project ROW.

The proposed Project would be expected to enable long-term productivity by importing energy generated in Canada to the U.S. power grid, thus applying downward pressure on electricity prices and replacing more emissive fossil-fueled sources of energy with hydroelectric sources.

7.6 Irreversible and Irretrievable Commitment of Resources

Irreversible and irretrievable commitments of resources refer to impacts on or losses of resources that cannot be reversed or recovered, even after an activity has ended. Irreversible commitment applies primarily to nonrenewable resources, such as minerals or cultural resources, and to those resources that are renewable only over long time spans, such as soil productivity. Irretrievable commitment applies to the loss of production, harvest, or natural resources. This section discusses irreversible and irretrievable commitments of resources as a result of implementing the proposed Project; these impacts are permanent.

7.6.1 Rare Species

Activities involving heavy machinery, which could include construction, maintenance, or emergency repairs, in the proposed Project ROW could result in the direct mortality of individual listed species. Most mobile species would be expected to avoid areas undergoing active ground disturbance. The loss of an individual of a protected species would be adverse, but is not expected to have irreversible or irretrievable impacts on the species as a whole. A draft Biological Assessment is being prepared in order to determine the impacts of the proposed Project on federally listed species, and DOE and USFWS consultation under Section 7 of the ESA is on-going (Appendix Q).

7.6.2 Wetland Type Conversion

The proposed Project would permanently clear woody vegetation from forested and shrub wetlands, allowing for only short-stature vegetation to regrow.

Though removing woody vegetation within a forested or shrub wetland would not reduce overall wetland acreage, it would convert the forested or shrub wetland area to a different vegetation community and wetland type. This would be considered an irretrievable and irreversible impact because the area would be continuously managed in an emergent, herbaceous state for the life of the project. This change could significantly shift the vegetation composition and hydrologic function and result in a measureable decrease in water uptake by vegetation. This decrease could have an associated influence on the suitability of wildlife habitat for certain species as well as wetland function.

represents employment opportunities and is considered beneficial.

7.6.3 Materials

Material resources irretrievably used to construct the proposed Project could include copper, lead, steel, concrete, bitumen, and other materials. These materials are not in such short supply that implementation of the proposed Project would limit other unrelated construction activities and their use would not be significant.

7.6.4 Energy

Energy resource used to construct the proposed Project would be irretrievably lost. During construction, gasoline and diesel fuel would be used for the operation of vehicles and heavy equipment. Intermittent inspection and emergency repair activities would also require gasoline and diesel fuel. Overall, consumption of energy resources would not place a significant demand on their availability in the region. Therefore, limited impacts are anticipated from the consumption of energy.

7.6.5 Landfill Space

The disposal of any excavated soils or other construction materials in a landfill would be an irretrievable, adverse impact. There are several landfills and construction and demolition processing facilities that could manage waste generated by construction of the proposed Project. However, any waste generated by the proposed Project that is disposed of in a landfill would be considered an irretrievable loss of that landfill space.

7.6.6 Human Resources

The use of human resources for construction is considered an irretrievable loss only in that it would preclude such personnel from engaging in other work activities. However, the use of human resources

This page intentionally left blank

Chapter 8 provides the list of individuals who filled primary roles in the preparation of this EIS.

8.1 Federal and State Agencies

Julie Smith of the Department of Energy Office of Electricity Delivery and Energy Reliability (DOE) and Bill Storm of the Minnesota Department of Commerce – Energy Environmental Review and Analysis (DOC-ERRA) directed the preparation of the Environmental Impact Statement (EIS). DOE invited other federal agencies to participate in the preparation of this EIS to ensure that it satisfies those agencies' environmental requirements and to engage their specialized expertise. The federal cooperating agencies include the St. Paul District of the U.S. Army Corps of Engineers (USACE), Region 5 of the U.S. Environmental Protection Agency (EPA), the Twin Cities Ecological Field Office (Region 3) of the U.S. Fish and Wildlife Service (USFWS), and the Red Lake Band of Chippewa Indians to act as cooperating agencies on the EIS. Table 8-1 lists the federal agency, state agency, and cooperating agencies.

8.2 EIS Preparation Team

The EIS Preparation Team was led by the EIS contractor Barr Engineering Co. (Barr) with support from Ecology and Environment Inc. (E & E) and Azar Law LLC. This team provided primary support and assistance to DOE and DOC-ERRA. Primary members of this team included John Wachtler (Barr), Cheryl Feigum (Barr), Dan Belin (E & E), Courtney Dohoney (E & E), and Lauren Azar (Azar Law LLC). In addition, a range of resource specialists, NEPA specialists, and technical writers were also part of the team. Table 8-2 lists each individual and their organization, education and experience, and responsibilities.

8.3 Responsibilities

DOE and DOC-ERRA provided direction to Barr and E & E which were responsible for developing analytical methodology and assessing the potential impacts of the alternatives, coordinating the work tasks, performing the impact analyses, and producing the document. DOE and DOC-ERRA were responsible for the scope, content, and organization of the EIS, data quality, and issue resolution and direction.

DOE and DOC-ERRA independently evaluated all supporting information and documentation prepared by the Barr and E & E project teams. Further, DOE and DOC-ERRA retained the

Table 8-1 List of the Lead Federal and State Agencies and Federal Cooperating Agencies

Name	Organization
Lead Agencies	
Julie Smith, Ph.D.	DOE Office of Electricity Delivery and Energy Reliability, Washington, DC
Bill Storm	Department of Commerce – Energy Environmental Review, St. Paul, MN
Cooperating Agencies	
Margaret Rheude	U.S. Fish and Wildlife Service
William Baer	U.S. Army Corps of Engineers, Bemidji Regulatory Field Office
Virginia Laszewski	U.S. Environmental Protection Agency Region 5
Joe Plumer	Red Lake Band of Chippewa Indians, Minnesota

responsibility for determining the appropriateness and adequacy of incorporating any data, analyses, and results of other work performed by Barr and E & E in the EIS. Barr and E & E were responsible for integrating this work into the EIS.

As required by Federal Regulations (40 CFR 1506.5(c)), Barr, E & E, and Azar Law LLC signed a NEPA Disclosure Statement in relation to the work they performed on this EIS. These signed statements are provided in Appendix T of this EIS.

Table 8-2 List of Preparers - EIS Preparation Team

Name, Organization	Education and Experience	Responsibility
Cheryl Feigum, PhD Vice President Barr Engineering Co.	Ph.D. Soil Science M.S. Zoology B.A. Biology Years of Experience: 15	Barr Project Manager
John Wachtler, Vice President Barr Engineering Co.	J.D. M.S. Civil and Environmental Engineering, B.S. Biology Years of Experience: 30	Barr Principal in Charge, Corridor Sharing, Electrical System Reliability
Louise Segroves Barr Engineering Co.	M.S. Geosciences B.A. Geology/Economics Years of Experience: 7	Barr Deputy Project Manager, Land- based Economies, Cultural Values, Relative Merits
Mike Strong Barr Engineering Co.	B.A. Environmental Studies Years of Experience: 9	GIS Management
Jessica Butler Barr Engineering Co.	M.S. Soil Science B.S. Resource Conservation Years of Experience: 11	Vegetation, Wildlife, Rare Natural Communities, Land-Based Economies
Shanna Braun Barr Engineering Co.	B.S. Natural Resources Management Years of Experience: 10	Water Resources, Cumulative Effects
Daniel Jones Barr Engineering Co.	M.S. Biology – Ecology and Evolution B.S. Botany and Plant Pathology Years of Experience: 24	Vegetation, Wildlife
Sarah Olson Barr Engineering Co.	B.S. Environmental Science Years of Experience: 4	Data Management
Kathy Brown Barr Engineering Co.	M.L.S. Library and Information Science B.S. Business Administration Years of Experience: 4	Administrative Record
Lauren Azar Azar Law LLC	J.D., M.S. Philosophy, B.S. Water Resources Management, B.A. Philosophy Years of Experience: 21	NEPA Advisor
Rick Holton Rick Holton Writing for Results	Ph.D. English, M.A. English, A.B. English Years of Experience: 25	Summary
Dan Belin, AICP E & E	M.S. Forestry, B.A. History/Environmental Studies Years of Experience: 19	E & E Project Director
Courtney Dohoney E & E	M.E.M. Environmental Management B.S. Environmental Studies Years of Experience: 9	E & E Project Manager
Katie Day E & E	M.S. Biology B.S. Biology and Environmental Studies Years of Experience: 9	E & E Deputy Project Manager
George Welsh E & E	M.S. Forest Resources, B.S. Forest Resource Management Years of Experience: 42	E & E Principal Reviewer
Natasha Snyder E & E	M.A. Anthropology B.A. Anthropology/Environmental Science A.A. Liberal Arts Years of Experience: 30	Cultural Resources
Carl Sadowski, AICP E & E	M.U.P. Urban Planning B.A. Environmental Design Years of Experience: 6	Transportation and Traffic

Name, Organization	Education and Experience	Responsibility
Laurie Kutina, CEM, REM E & E	M.B.A. Business Administration, M.A. Architecture, B.A. Physics Years of Experience: 22	Air Quality and Greenhouse Gas
Joe Donaldson E & E	M.L.A. Landscape Architecture , B.A. Architecture Years of Experience: 37	Aesthetics
Kathleen Welder E & E	M.S. Environmental Science, B.A. Urban Studies Years of Experience: 13	Environmental Justice and Socioeconomics
Silvia Yanez E & E	M.S. Development and Environment Diploma (M.S. Equivalent) Environmental Management Diploma (B.S. Equivalent) Chemical Engineering Years of Experience: 13	Noise, Human Health and Safety

This page intentionally left blank

1. Minnesota Power. Application for Presidential Permit and Route Permit. Great Northern Transmission Line. [Online] 2014. <http://www.greatnortherneis.org/Home/documents>.
2. U.S. Environmental Protection Agency. Minnesota Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants. Green Book. [Online] January 30, 2015. [Cited: February 4, 2015.] http://www3.epa.gov/airquality/greenbk/anayo_mn.html
3. Weber, William V. and Jensen, Glenn A. A Study of High Voltage Power Line Easements and their Effect on Farm Land Values in West Central Minnesota. Luverne, Minnesota: Jensen Management Service. 1978.
4. Jensen, Glenn A. and Weber, William V. High Voltage Transmission Lines and their Effect on Farm Land Value in West Central Minnesota. Luverne, Minnesota: Jensen Management Service, Inc. 1982.
5. Jackson, Thomas O. and Pitts, Jennifer. The Effects of Electric Transmission Lines on Property Values: A Literature Review. Journal of Real Estate Literature. 2010, Vol. 18, 2, pp. 239-259.
6. Scholten, A., Joosten, S. and Silny, J. Unipolar cardiac pacemakers in electromagnetic fields of high voltage overhead lines. Journal of Medical Engineering & Technology. Jul-Aug 2005, Vol. 29, 4, pp. 170-175.
7. Electric Power Research Institute. Electromagnetic Interference with Implanted Medical Devices. 2004.
8. Minnesota Power. Response to Information Request regarding Project Development in Western Region. March 9, 2015.
9. —. cost comparison - Minnesota Power Response to Request for Information from DOE. April 1, 2015.
10. Minnesota Pollution Control Agency. A Guide to Noise Control In Minnesota: Acoustical Properties, Measurement, Analysis and Regulation. 2008.
11. Federal Highway Administration (FHWA). FHWA Roadway Construction Noise Model User's Guide. FHWA-HEP-05-054. January 2006.
12. Power Engineer. Great Northern Transmission Line Project – EMF and Corona Effects Calculations Memorandum. August 8, 2013.
13. —. Great Northern Transmission Line Project – EMF and Corona Effects Calculations with Adjacent Lines Memorandum. January 27, 2014.
14. McDonald, John D. (editor). Electric Power Substations Engineering. 2nd. s.l. : CRC Press, 2007.
15. National Electrical Manufacturers Association (NEMA). Transformers, Regulators and Reactors NEMA Standards Publication TR-1-1993 (R2000). Rosslyn, VA : s.n., 2000.
16. U.S. Environmental Protection Agency. Air Quality. U.S. Environmental Protection Agency Air Quality Planning and Standards. [Online] [Cited: April 16, 2015.] <http://www.epa.gov/airquality/cleanair.html>
17. —. National Ambient Air Quality Standards (NAAQS). U.S. Environmental Protection Agency - Air and Radiation. [Online] October 21, 2014. [Cited: January 15, 2015.] www3.epa.gov/ttn/naaqs/criteria.html
18. —. Overview of Greenhouse Gases. U.S. Environmental Protection Agency - Climate Change. [Online] May 7, 2015. [Cited: May 7, 2015.] <http://www.epa.gov/climatechange/ghgemissions/gases/fgases.html>
19. U.S. Council on Environmental Quality. Revised Draft Guidance for Greenhouse Gas Emissions and Climate Change Impacts. the White House. [Online] [Cited: March 15, 2015.] https://www.whitehouse.gov/sites/default/files/docs/nepa_revised_draft_ghg_guidance_searchable.pdf
20. U.S. Environmental Protection Agency. Climate Change Impacts and Adapting to Change. Climate Change. [Online] [Cited: April 16, 2015.] <http://www3.epa.gov/climatechange/adaptation/overview.html>
21. —. FACT SHEET: Clean Power Plan State Roles. Carbon Pollution Standards. [Online] 2015. [Cited: February 5, 2015.] <http://www2.epa.gov/carbon-pollution-standards/fact-sheet-clean-power-plan-state-roles>
22. Minnesota Power. Energy Forward Strategy. Energy Forward. [Online] 2015. [Cited: April 16, 2015.] <http://www.mnpower.com/Environment/EnergyForward>

23. U.S. Environmental Protection Agency. Visibility in our Nation's Parks and Wilderness Areas. Visibility. [Online] May 31, 2012. [Cited: February 5, 2015.] <http://www.epa.gov/airquality/visibility/monitor.html>
24. —. Air Quality Index Report for Minnesota by County, 2013 and 2014. Air Data. [Online] [Cited: March 4, 2015.] <http://www.epa.gov/airdata/>
25. Smith, James E., et al. Methods for Calculating Forest Ecosystem and Harvested Carbon with Standard Estimates for Forest Types of the United States. United States Department of Agriculture -Forest Service – Northeastern Research Station. General Technical Report NE-343. 2006.
26. Minnesota Power. 2013 Resource Plan for Minnesota Power. Docket No. E015/RP-13-53. [Online] March 1, 2013. [Cited: April 16, 2015.] <http://www.mnpower.com/Environment/ResourcePlan>
27. U.S. Environmental Protection Agency. Emissions of Fluorinated Gases. U.S. Environmental Protection Agency - Climate Change - Overview of Greenhouse Gases. [Online] 2015. [Cited: April 16, 2015.] <http://www.epa.gov/climatechange/ghgemissions/gases/fgases.html>
28. U.S. Environmental Protection Agency. SF6 Emission Reduction Partnership for Electric Power Systems. U.S. Environmental Protection Agency. [Online] May 18, 2015. [Cited: April 16, 2015.] <http://www3.epa.gov/highgwpl/electricpower-sf6/>
29. Minnesota Department of Health. Minnesota Climate Change Vulnerability Assessment. Minnesota Department of Health - Climate and Health. [Online] October 2014. <http://www.health.state.mn.us/divs/climatechange/docs/mnclimvulnreport.pdf>
30. Minnesota Pollution Control Agency, Interagency Climate Adaption Team. Adapting to Climate Change in Minnesota. Minnesota Pollution Control Agency. [Online] 2013. <http://www.pca.state.mn.us/index.php/view-document.html?gid=15414>
31. Public Service Commission of Wisconsin. Arrowhead-Weston Electric Transmission Line Project: Final Environmental Impact Statement Volume I, Docket 05-CE-113. October 2000.
32. Arora and Mosch. High Voltage and Electrical Insulation Engineering. John Wiley and Sons. Hoboken, NJ. 2011. p. 165.
33. Bonneville Power Administration. Big Eddy-Knight Transmission Project Final Environmental Impact Statement. July 2011.
34. Minnesota Department of Transportation. Traffic Forecasting & Analysis, Traffic Volume (AADT/HCAADT). Minnesota Department of Transportation. [Online] 2014. [Cited: March 3, 2015.] <http://www.dot.state.mn.us/traffic/data/data-products.html#volume>
35. —. Minnesota Freight Railroad Map. Minnesota Department of Transportation. [Online] January 2015. [Cited: March 4, 2015.] <http://www.dot.state.mn.us/ofrw/maps/MNRailMap.pdf>
36. University of Minnesota, Duluth, Bureau of Business and Economic Research; Labovitz School of Business and Economics. Minnesota Power/Manitoba Hydro Great Northern Transmission Line Economic Impact on Northern Minnesota. July 2013.
37. Minnesota Department of Transportation. Utility Accommodation on Highway Right of Way. Minnesota Department of Transportation. [Online] 2015. [Cited: March 3, 2015.] <http://www.dot.state.mn.us/policy/operations/op002.html>
38. U.S. Government Publishing Office. Title 14: Aeronautics and Space, Part 77-Safe, Efficient Use, and Preservation of the Navigable Airspace, Subpart B-Notice Requirements. Electronic Code of Federal Regulations (e-CFR). [Online] May 14, 2015. <http://www.ecfr.gov/cgi-bin/text-idx?SID=c957224f6e2b4fb1f2fc236f5da09558&node=pt14.2.77&rgn=div5>
39. Federal Aviation Administration. Data Dictionaries: Facilities, Runways. County: Roseau, Lake of the Woods, Koochiching, Beltrami, Itasca. Airport Data & Contact Information. [Online] April 30, 2015. [Cited: March 6, 2015.] https://www.faa.gov/airports/airport_safety/airportdata_5010/
40. Minnesota Department of Natural Resources. Wildfire Information. Division of Forestry. [Online] [Cited: March 2, 2015.] <http://www.dnr.state.mn.us/forestry/fire/index.html>

41. U.S. Environmental Protection Agency. Final Guidance For Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses. U.S. Environmental Protection Agency. [Online] April 1998. [Cited: February 27, 2015.] http://www.epa.gov/environmentaljustice/resources/policy/ej_guidance_nepa_epa0498.pdf
42. U.S. Census Bureau. 2012 American Community Survey. American Fact Finder - DP05: ACS Demographic and Housing Estimates. [Online] 2012. [Cited: May 14, 2015.] http://factfinder.census.gov/bkmk/table/1.0/en/ACS/12_5YR/DP05/1600000US2705068|1600000US2725118|1600000US2731040
43. —. 2008–2012 American Community Survey 5-year Estimates. Geography includes Minnesota, and selected Minnesota Counties, and selected Minnesota census tracts. American Fact Finder - DP05: ACS Demographic and Housing Estimates. [Online] 2012. [Cited: February 20, 2015.] http://factfinder.census.gov/bkmk/table/1.0/en/ACS/12_5YR/DP05/0400000US27|0500000US27007|0500000US27061|0500000US27071|0500000US27077|0500000US27135|1400000US27007450500|1400000US27061480100|1400000US27061480400|1400000US27061480600|1400000US27061481000|1400000US27071790300|1400000US27071790500|1400000US27077460300|1400000US27077460400|1400000US27135970100|1400000US27135970200|1400000US27135970300|1400000US27135970400
44. —. 2012 American Community Survey 1-Year Estimates. American Fact Finder - DP05: ACS Demographic and Housing Estimates. [Online] 2012. [Cited: May 14, 2015.] http://factfinder.census.gov/bkmk/table/1.0/en/ACS/12_1YR/DP05/0400000US27
45. Council on Environmental Quality, Executive Office of the President. Environmental Justice, Guidance Under the National Environmental Policy Act. U.S. Environmental Protection Agency. [Online] December 10, 1997. [Cited: February 27, 2015.] http://www3.epa.gov/environmentaljustice/resources/policy/ej_guidance_nepa_ceq1297.pdf
46. U.S. Census Bureau. 2009–2013 American Community Survey 5-year Estimates. Geography includes Minnesota, Beltrami County, and the following reservations: Boise Forte, Fond du Lac, Grand Portage, Leech Lake, Mill Lacs, Red Lake, and White Earth. American Fact Finder - DP03: ACS Demographic Housing Estimates. [Online] 2013. http://factfinder.census.gov/bkmk/table/1.0/en/ACS/13_5YR/DP03/2500000US0335|2500000US1125|2500000US1355|2500000US1940|2500000US2270|2500000US3100|2500000US4595
47. Minnesota Department of Natural Resources. 2014 Minnesota Hunting & Trapping Regulations Handbook. [Online] 2014. [Cited: May 13, 2015.] http://files.dnr.state.mn.us/rhp/regulations/hunting/2014/full_regs.pdf
48. Red Lake Department of Natural Resources. Red Lake Fisheries Program. Red Lake Department of Natural Resources. [Online] 2015. [Cited: May 14, 2015.] <http://www.redlakednr.org/Fisheries.html>
49. Minnesota Department of Natural Resources. Wild Rice Management. Minnesota Department of Natural Resources. [Online] 2015. [Cited: May 13, 2015.] <http://www.dnr.state.mn.us/wildlife/shallowlakes/wildrice.html>
50. —. Natural Wild Rice in Minnesota: A Wild Rice Study document submitted to the Minnesota Legislature. Minnesota Department of Natural Resources. [Online] February 15, 2008. [Cited: May 13, 2015.] http://files.dnr.state.mn.us/fish_wildlife/wildlife/shallowlakes/natural-wild-rice-in-minnesota.pdf
51. U.S. Census Bureau. GCT-PH1: Population, Housing Units, Area, and Density: 2010--County--County Subdivision and Place, 2010 Census Summary File 1. U.S. Census Bureau. [Online] 2010. [Cited: March 11, 2015.] http://factfinder.census.gov/bkmk/table/1.0/en/DEC/10_SF1/GCTPH1.CY10/0500000US2707|0500000US27061|0500000US27071|0500000US27077|0500000US27135
52. —. GCT-PH1: Population, Housing Units, Area, and Density: 2010--State--Place, 2010 Census Summary File 1. s.l. : U.S. Census Bureau, 2010.

53. —. 2008-2012 American Community Survey 5-Year Estimates. Geography includes Bemidjii Grand Rapids, and International Falls, Minnesota. American Fact Finder - DP05: ACS Demographic and Housing Estimates. [Online] 2012. [Cited: February 20, 2015.] http://factfinder.census.gov/bkmk/table/1.0/en/ACS/12_5YR/DP05/1600000US2705068|1600000US2725118|1600000US2731040
54. —. 2010 Census Summary File 1. American FactFinder - DP-1: Profile of General Population and Housing Characteristics: 2010. [Online] 2010. [Cited: February 21, 2015.] <http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk>
55. Minnesota State Demographic Center. Projections. Minnesota State Demographic Center - Our Projections. [Online] 2014. [Cited: February 21, 2015.] <http://mn.gov/admin/demography/data-by-topic/population-data/our-projections/>
56. Minnesota Department of Employment and Economic Development. Minnesota Unemployment Statistics LAUS (Local Area Unemployment Statistics) Data. Minnesota Department of Employment and Economic Development. [Online] 2014. [Cited: February 21, 2015.] <https://apps.deed.state.mn.us/lmi/laus/Default.aspx>
57. Minnesota Revenue Department. Preliminary 2014 Property Tax Levies. Minnesota Revenue Department - Property Tax. [Online] 2014. [Cited: February 22, 2015.] http://www.revenue.state.mn.us/propertytax/Pages/ptlevies_14p.aspx
58. Association of Minnesota Counties. County Government Revenue. Association of Minnesota Counties. [Online] September 2010. [Cited: February 22, 2015.] http://www.mncounties.org/Publications/FYIs/PDF/County_Revenues10.pdf
59. Minnesota Revenue Department. Corporate Franchise Tax. Minnesota Revenue Department - 2015 Legislative Resources. [Online] 2015. [Cited: February 22, 2015.] http://www.revenue.state.mn.us/legislativeupdate/Documents/Corporate_Tax.pdf
60. Explore Minnesota. All Places to Stay. Explore Minnesota - Places to Stay. [Online] 2015. [Cited: February 21, 2015.] http://www.exploreminnesota.com/places-to-stay/all-places-to-stay/?keywords=&pageIndex=0&radius=0&mapTab=false&sortOrder=asc&sort=random&daily&locationid=®ion_id=&attrFieldsAtLeast=&attrFieldsAtMost=&startDate=false&class_id=1&lat=&lon=&city=&pageSize=2
61. Red Lake Nation. Red Lake Nation Foods Incorporated. Red Lake Nation Foods. [Online] 2015. [Cited: May 11, 2015.] <http://redlakenationfoods.com/index.cfm/home>
62. Red Lake Fishery. Red Lake Nation Fishery. Red Lake Fishery. [Online] 2015. [Cited: May 11, 2015.] <http://www.redlakewalleye.com/>
63. Red Lake Nation. Red Lake Band of Chippewa Indians. Red Lake Nation - Red Lake, Minnesota. [Online] 2015. [Cited: May 11, 2015.] <http://www.redlakenation.org/>
64. Minnesota Department of Natural Resources. State Forests, Rules. Minnesota Department of Natural Resources - State forests. [Online] 2015. [Cited: May 6, 2015.] http://www.dnr.state.mn.us/state_forests/rules.html
65. —. State Parks, Rules. Minnesota Department of Natural Resources - Minnesota State Parks. [Online] 2015. [Cited: March 6, 2015.] http://www.dnr.state.mn.us/state_parks/rules.html
66. Bonneville Power Administration. Living and Working Safely Around High-Voltage Power Lines. Bonneville Power Administration. [Online] 2007. [Cited: February 19, 2015.] <http://www.bpa.gov/news/pubs/GeneralPublications/lusi-Living-and-working-safely-around-high-voltage-power-lines.pdf>
67. Great River Energy. Safety Around Power Lines. Great River Energy. [Online] [Cited: February 19, 2015.] <http://www.greatriverenergy.com/deliveringelectricity/safety/safetyaroundpowerlines.pdf>
68. National Cancer Institute. Magnetic Field Exposure and Cancer. National Cancer Institute at the National Institute of Health. [Online] November 3, 2014. <http://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/magnetic-fields-fact-sheet>

69. National Institute of Environmental Health Sciences. EMF Electric and Magnetic Fields Associated with the Use of Electric Power - Questions & Answers. [Online] June 2002. http://www.niehs.nih.gov/health/assets/docs_p_z/results_of_emf_research_emf_questions_answers_booklet.pdf
70. Lee, Jack M. Electrical and Biological Effects of Transmission Lines: A Review. Prepared for Bonneville Power Administration. Portland, OR : s.n., 2006.
71. International Commission on Non-ionizing Radiation Protection. Guidelines for Limiting Exposure to Time-Varying Electric and Magnetic Fields (1 Hz – 100 kHz). Health Physics. 2010, Vol. 99, 6, pp. 818-836.
72. Public Service Commission of Wisconsin. Environmental Impacts of Transmission Lines. [Online] July 2013. <http://psc.wi.gov/thelibrary/publications/electric/electric10.pdf>
73. Reinemann, Douglas J. Literature Review and Synthesis of Research Findings on the Impact of Stray Voltage on Farm Operations. Ontario Energy Board. [Online] March 2008, 31. http://www.ontarioenergyboard.ca/oeb/_Documents/EB-2007-0709/report_Reinemann_20080530.pdf
74. Wisconsin Public Service Corporation. Answers to your Stray Voltage Questions: Backed By Research. Wisconsin Public Service - Your Business - Your Farm - Stray Voltage. [Online] 2011. http://www.wisconsinpublicservice.com/business/pdf/farm_voltage.pdf
75. North American Electric Reliability Corporation. State of Reliability 2013. [Online] May 2013. http://www.nerc.com/pa/rapa/pa/performance%20analysis%20dl/2013_sor_may%2015.pdf
76. Kemp, John. Protecting the power grid from sabotage and terrorism: Kemp. Reuters. [Online] February 17, 2015. [Cited: February 19, 2015.] <http://www.reuters.com/article/2014/02/17/electricity-sabotage-terrorism-idUSL6N0LM1ZG20140217>
77. Blinder, Alan. Power Grid is Attacked in Arkansas. The New York Times. [Online] October 8, 2013. [Cited: February 13, 2015.] http://www.nytimes.com/2013/10/09/us/power-grid-is-attacked-in-arkansas.html?_r=1
78. Energy Sector Control Systems Working Group. Roadmap to Achieve Energy Delivery Systems Cybersecurity. Energy.gov. [Online] September 2011. [Cited: February 13, 2015.] http://energy.gov/sites/prod/files/Energy%20Delivery%20Systems%20Cybersecurity%20Roadmap_finalweb.pdf
79. National Insurance Crime Bureau, Nation Equipment Register. 2012 Equipment Theft Report. NER - Annual Theft Report. [Online] 2012. [Cited: February 13, 2015.] <https://www.nicb.org/File%20Library/Public%20Affairs/2012-NICB-HEreport.pdf>
80. LoJack Corporation. Heavy Construction Equipment and Theft: The 2011 LoJack Corporation Study on Heavy Construction Equipment Theft. For Construction Pros. [Online] September 18, 2012. http://media.cygnus.com/files/cygnus/document/FCP/2012/SEP/lojack-2011-theft-study-final_10781172.pdf
81. Minnesota Pollution Control Agency. What's In My Neighborhood Database. Data - WMN: What's in My Neighborhood. [Online] 2015. [Cited: February 24, 2015.] <http://www.pca.state.mn.us/index.php/data/wimn-whats-in-my-neighborhood/whats-in-my-neighborhood.html>
82. U.S. Department of Labor. Work-related Fatalities, Injuries, and Illnesses - Construction. Bureau of Labor Statistics - Industries at a Glance - Construction: NAICS 23. [Online] 2014. [Cited: January 9, 2015.] http://www.bls.gov/iag/tgs/iag23.htm#fatalities_injuries_and_illnesses
83. —. Work-related Fatalities, Injuries, and Illnesses - Utilities. Bureau of Labor Statistics - Industries at a Glance - Utilities: NAICS 22. [Online] 2014. [Cited: January 09, 2015.] http://www.bls.gov/iag/tgs/iag22.htm#fatalities_injuries_and_illnesses
84. —. Table A-1. Fatal occupational injuries by industry and event or exposure, all United States, 2013. Bureau of Labor Statistics - Injuries, Illnesses, and Fatalities . [Online] 2014. [Cited: January 11, 2015.] <http://www.bls.gov/iif/oshwc/cfoi/cftb0277.pdf>
85. —. Table 1. Incidence rates of nonfatal occupational injuries and illnesses by industry and case types, 2013. Bureau of Labor Statistics - Injuries, Illnesses, and Fatalities. [Online] 2014. [Cited: January 11, 2015.] <http://www.bls.gov/iif/oshwc/osh/os/ostb3958.pdf>

86. General Electric Industrial Solutions - Cameron G. Clark: GE Specification Engineer. The Basics of Arc Flash. GE Industrial Solutions. [Online] https://www.geindustrial.com/sites/geis/files/gallery/The-Basics-of-Arc-Flash-Article_GE_Industrial_Solutions_0.pdf
87. U.S. Army Corps of Engineers. Visual Impact Assessment Procedure for US Army Corps of Engineers. Instruction Report EL-88-1, prepared by State University of New York, Syracuse, for US Army Engineer Waterways Experiment Station, Vicksburg, Miss. Syracuse, New York : State University of New York, College of Environmental Science and Forestry, March 1988.
88. U.S. Department of Transportation Federal Highway Administration Office of Environmental Policy. Visual Impact Assessment for Highway Projects. Publication No. FHWA-HI-88-054. California Department of Transportation - Standard Environmental Reference. [Online] Publication No. FHWA-HI-88-054, 1981. Office of Environmental Policy. <http://www.dot.ca.gov/ser/downloads/visual/FHWAVisualImpactAssmt.pdf>
89. U.S. Forest Service U.S Department of Agriculture. National Forest Landscape Management Volume 2, Chapter 1: The Visual Management System: Agriculture Handbook Number 462. [Online] April 1974. [Cited: September 5, 2013.] <http://pbadupws.nrc.gov/docs/ML1224/ML12241A372.pdf>
90. U.S. Forest Service; U.S. Department of Agriculture. Landscape Aesthetics: A Handbook for Scenery Management. Agriculture Handbook Number 701. U.S. Forest Service - Continental Divide National Scenic Trail. [Online] December 1995. [Cited: September 5, 2013.] www.fs.fed.us/cdt/carrying_capacity/landscape_aesthetics_handbook_701_no_append.pdf
91. Bureau of Land Management. Visual Resource Contrast Rating - Bureau of Land Management Handbook 8431-1. U.S. Department of the Interior Bureau of Land Management. [Online] January 17, 1986. [Cited: January 7, 2013.] Washington, D.C.. http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/blm_handbook.Par.79462.File.dat/8431.pdf
92. Minnesota Department of Natural Resources. Ecological Classification System. Minnesota Department of Natural Resources - Nature. [Online] 2015. [Cited: February 20, 2015.] <http://www.dnr.state.mn.us/ecs/index.html>
93. Wind Turbine Visibility and Visual Impact Threshold Distances in Western Landscapes. Sullivan, Robert G., et al. Portland, OR : s.n., 2012. National Association of Environmental Professionals 37th Annual Conference.
94. Minnesota Department of Natural Resources; U.S. Fish and Wildlife Service. Beltrami Island Land Utilization Project Comprehensive Conservation Management Plan. U.S. Fish & Wildlife Service Division of Conservation Planning - Completed Planning Projects. [Online] 2013. [Cited: May 13, 2015.] http://files.dnr.state.mn.us/input/mgmtplans/beltrami_island/final-lup-ccmp.pdf
95. Minnesota Department of Natural Resources. School Trust Lands. Minnesota Department of Natural Resources - About the DNR - School Lands. [Online] 2015. [Cited: March 11, 2015.] http://www.dnr.state.mn.us/aboutdnr/school_lands/index.html
96. Roseau County. Roseau County Floodplain Management Ordinance. Ordinance No. 29. Roseau County Minnesota - County Ordinances. [Online] November 20, 2001. [Cited: February 18, 2015.] <http://www.co.roseau.mn.us/ordinances/Ordinance%20No.%2029%20-%20Flood%20Plain%20Management%20Ordinance.pdf>
97. Headwaters Regional Development Commission. Lake of the Woods County Comprehensive Land Use Plan. Lake of the Woods County - Land & Water Planning. [Online] March 28, 2000. [Cited: February 12, 2015.] <http://www.co.lake-of-the-woods.mn.us/PDF/Plans/Comp%20Land%20Use%20Plan.pdf>
98. Lake of the Woods County. Lake of the Woods County Zoning Ordinance. Lake of the Woods County - Land & Water Planning. [Online] October 3, 2011. [Cited: February 12, 2015.] http://www.co.lake-of-the-woods.mn.us/PDF/Ordinances/October_3_2011_Zoning_Ordinance.pdf
99. Minnesota Department of Natural Resources. Forest Action Plans. National Association of State Foresters. [Online] June 2010. [Cited: May 13, 2015.] <http://www.forestationplans.org/states/minnesota>

100. Chinni, Dante and Gimpel Ph.D., James. *Our Patchwork Nation: The Surprising Truth About the "Real" America*. New York : Penguin Group (USA) Inc., 2011.
101. Woodard, Colin. *American Nations: A History of the Eleven Rival Regional Cultures of North America*. New York : Penguin Publishing Group, 2012.
102. U.S. Department of Energy Office of Electricity Delivery and Energy Reliability and Minnesota Department of Commerce Energy Environmental Review and Analysis. *Scoping Summary Report, Great Northern Transmission Line Environmental Impact Statement*. November 2014.
103. Mayer, M. L. *The Red Lake Ojibwe*. [book auth.] Herbert Edgar Wright, Barbara Coffin and Norman E. Aaseng. *The Patterned Peatlands of Minnesota*. Minneapolis : University of Minnesota Press, 1992.
104. Minnesota Department of Agriculture; U.S. Department of Agriculture. *2012 Minnesota Agricultural Statistics*. 2012.
105. Ye, Su. *Minnesota Agriculture Profile*. Minnesota Department of Agriculture. [Online] 2014. <https://www.mda.state.mn.us/en/~media/Files/agprofile.ashx>
106. U.S. Department of Agriculture. *2012 Census of Agriculture County Profiles*. [Online] 2012. [Cited: February 25, 2015.] http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1_Chapter_2_County_Level/Minnesota/st27_2_001_001.pdf
107. Minnesota Department of Natural Resources; Labovitz School of Business and Economics, University of Minnesota Duluth. *Economic Contribution of Minnesota's Forest Products Industry - 2011 edition*. [Online] April 2011. [Cited: May 15, 2015.] <http://files.dnr.statemn.us/forestry/um/economiccontributionMNforestproductsindustry2011.pdf>
108. Tuck, Brigid University of Minnesota | Extension. *Economic Composition of Northwest Minnesota: Industries and Performance*. University of Minnesota | Extension - Understanding Economic Change. [Online] September 2014. [Cited: May 15, 2015.] <http://www.extension.umn.edu/community/economic-impact-analysis/reports/docs/2014-Northwest-MN.pdf>
109. —. *Economic Composition of the Headwaters Region of Minnesota: Industries and Performance*. University of Minnesota | Extension - Understanding Economic Change. [Online] November 2014. [Cited: May 15, 2015.] <http://www.extension.umn.edu/community/economic-impact-analysis/reports/docs/2014-headwaters-MN.pdf>
110. Minnesota Department of Natural Resources. *Letter to Bill Storm. In the Matter of the Application of Minnesota Power for a Route Permit for the Great Northern Transmission Line Public Utilities Commission*. Docket Number E-015/TL14-21, Minnesota Department of Natural Resources EBDB Number: 20130195. August 15, 2014.
111. Advisory Council on Historic Preservation. *360 CFR Part 800 -- Protection of Historic Properties (incorporating amendments effective August 5, 2004)*. Advisory Council on Historic Preservation. [Online] [Cited: May 19, 2015.] <http://www.achp.gov/regs-rev04.pdf>
112. National Park Service Cultural Resources U.S. Department of the Interior. *How to Apply the National Register Criteria for Evaluation - National Register Bulletin*. National Park Service National Register of Historic Places Program: Publications. [Online] [Cited: May 19, 2015.] <http://www.nps.gov/nr/publications/bulletins/pdfs/nrb15.pdf>
113. Executive Order No. 13175. *Consultation and Coordination with Indian Tribal Governments*. 65 Federal Regulation 67249. November 6, 2000. p. 2806.
114. U.S. Department of Energy. *American Indian and Alaska Native Tribal Government Policy*. 2009.
115. Gibbon, Guy E, Johnson, Craig M and Hobbs, Elizabeth. *Minnesota's Environmental and Native American Culture History in Predictive Model of Precontact Archaeological Site Location of the State of Minnesota*. Minnesota Department of Transportation. [Online] 2002. St. Paul, Minnesota. <http://www.dot.state.mn.us/mnmodel/P3FinalReport/chapter3.html>

116. Dobbs, C A. Historic Context Outlines: The Contact Period Contexts (ca 1630 A.D.-1820 A.D.) In Minnesota History Sites and Structures: A Comparative Planning Series. s.l., St. Paul, Minnesota : Institute of Minnesota Archaeological Reports of Investigations, 1990. Vol. 30. On file at the State Historic Preservation Office.
117. U.S. Geological Survey. Groundwater use in the United States. U.S. Water Science School. [Online] <http://water.usgs.gov/edu/wugw.html>
118. Minnesota Pollution Control Agency. MPCA Impaired Lakes (2014 Draft data). Water - Water Types and Programs - Impaired Waters and TMDLs - Minnesota's Impaired Waters List. [Online] 2014. <http://www.pca.state.mn.us/index.php/water/water-types-and-programs/minnesotas-impaired-waters-and-tmdls/impaired-waters-list.html>
119. —. MPCA Impaired Streams (2014 Draft data). Water - Water Types and Programs - Impaired Waters and TMDLs - Minnesota's Impaired Waters List. [Online] 2014. <http://www.pca.state.mn.us/index.php/water/water-types-and-programs/minnesotas-impaired-waters-and-tmdls/impaired-waters-list.html>
120. U.S. Environmental Protection Agency. Wetlands - Wetland Types. U.S. Environmental Protection Agency - Water: Wetlands. [Online] 2013. http://water.epa.gov/type/wetlands/types_index.cfm
121. Cowardin, L.M., V. Carter, F.C. Golet, R.T. LaRoe. Classification of Wetlands and Deepwater Habitats of the United States. s.l. : U.S. Fish and Wildlife Service, 1979. p. 103. FWS/OBS079/31.
122. Minnesota Department of Agriculture. Minnesota Noxious Weeks. Minnesota Department of Agriculture - Plants, Pests & Pest Control - Pest Management - Noxious & Invasive Week Program. [Online] <http://www.mda.state.mn.us/plants/pestmanagement/weedcontrol/noxiouslist.aspx>
123. Minnesota Power. Response to Requests for Information from DOE - Preliminary Design Changes/Additional Information. December 1, 2014.
124. —. Preliminary Design Changes/Additional Information. December 1, 2014.
125. Minnesota Department of Natural Resources, Division of Ecological Services. Tomorrow's Habitat for the Wild and Rare: An Action Plan for Minnesota Wildlife Conservation Strategy. 2006.
126. Minnesota Department of Natural Resources. Subsection Forest Resources Management Plan (SFRMP) - Special Management Area Plan: Great Gray Owl Management Area. 2006b.
127. U.S. Fish and Wildlife Service. Endangered Species Program - **Minnesota**. [Online] 2015. <http://www.fws.gov/midwest/endangered/lists/minnesot-cty.html>
128. —. Wolf Fact Sheets. U. S. Fish & Wildlife Service Wolf - Western Great Lakes. [Online]
129. —. Canada Lynx. Endangered Species Program. [Online] 2013. <http://www.fws.gov/mountain-prairie/species/mammals/lynx/>
130. —. Piping Plover Fact Sheet. Endangered Species. [Online] 2001. <http://www.fws.gov/midwest/endangered/pipingplover/pipingpl.html>
131. —. Northern Long-Eared Bat. Endangered Species. [Online] 2015. <http://www.fws.gov/midwest/endangered/mammals/nleeb/nleebFactSheet.html>
132. Minnesota Department of Natural Resources. Natural Heritage Information System Database. Copyright 2014. State of Minnesota, Department of Natural Resources. Access by Barr Engineering under License Agreement LA-674. [Online]
133. —. High Conservation Value Forests (HCVFs) Fact Sheet. [Online] May 2015. <http://files.dnr.state.mn.us/forestry/certification/hcvf-factsheet.pdf>
134. —. Personal Communication to Barr Engineering Co. (email). December 10, 2014.
135. Minnesota Power. Application for a Certificate of Need: Great Northern Transmission Line. MPUC Docket No. E-015/CN-12-1163. October 21, 2013.
136. Beltrami County. Beltrami County Shoreland Management Ordinance. County Ordinance. [Online] 2006. [Cited: February 19, 2015.] <http://www.co.beltrami.mn.us/Government/Ordinances/Ordinances.html>

137. Koochiching County. Koochiching County Development Ordinance. [Online] 2008. [Cited: February 19, 2015.] <http://www.co.koochiching.mn.us/dept/esd/Kooch%20dev%20ords%20clean%20copy.pdf>
138. Itasca County. Zoning Ordinance, Itasca County, Minnesota. Itasca County Environmental Services. [Online] 2012. [Cited: February 12, 2015.] <https://www.co.itasca.mn.us/Home/Departments/Environmental%20Services/Documents/2012.04.15%20Zoning%20Ordinance.pdf>
139. Bradoff, K L. Ditching tof Red Lake Peatland During the Homestead Era. [book auth.] Patterned Peatlands of Minnesota. [ed.] H E Wright Jr. and N E Aaseng. Wright, Herbert Edgar; Coffin, Barbara; Aaseng, Norman E. Minneapolis : University of Minesota Press, 1992, pp. 263-284.
140. Minnesota Department of Natural Resources. Big Bog State Recreation Area. Minnesota Department of Natural Resources - Destinations - State Parks. [Online] 2015. [Cited: March 6, 2015.] http://www.dnr.state.mn.us/state_parks/big_bog/index.html
141. Tuck, Brigid University of Minnesota | Extension. Economic Composition of Northeast Minnesota: Industries and Performance. University of Minnesota | Extension - Understanding Economic Change. [Online] November 2014. [Cited: May 15, 2015.] <http://www.extension.umn.edu/community/economic-impact-analysis/reports/docs/2014-Northeast-MN.pdf>
142. Dobbs, C. A. Outline of Historic Contexts for the Prehistoric Period (ca. 12,000-A.D. 1700). Minnesota History in Sites and Structures: A Comprehensive Planning Series. St. Paul : Institute for Minnesota Archaeology Reports of Investigations, 1989. Vol. 56.
143. Arrowhead Regional Development Commission (ARDC). Taconite Comprehensive Plan. ARDC's Regional Planning Division. [Online] 2007. [Cited: March 6, 2015.] <http://www.arrowheadplanning.org/Default.asp?PageID=1169>
144. Minnesota Power. Proposed Transmission Line Alignment. Shapefiles received via HDR Sharepoint (GNTL.zip). October 14, 2014.
145. Minnesota Department of Commerce. High Voltage Transmission Lines. Shapefile from Nancy Rader, Minnesota Department of Commerce to Barr Engineering Co. May 30, 2014.
146. Minnesota Power. Residences. Shapefiles received via HDR Sharepoint (Data.zip). August 14, 2014.
147. State Historic Preservation Society - Minnesota Historical Society. Historic Sites. SHPO - Survey and Inventory - Statewide Inventories. [Online] <http://www.mnhs.org/shpo/survey/inventories.php>
148. Minnesota Department of Natural Resources. State Forests. The DNR Data Deli. [Online] 2003. <http://deli.dnr.state.mn.us>
149. Minnesota Department of Transportation. Scenic Byways - 2013-2014 Official Highway Map - Minnesota. State Highway Map. [Online] 2013. <http://www.dot.state.mn.us/statemap/2013/mapfront.pdf>
150. Minnesota Department of Natural Resources. Snowmobile Trails. The DNR Data Deli. [Online] 2010. <http://deli.dnr.state.mn.us>
151. U.S. Geological Survey. GAP Land Cover. U.S. Geological Survey - National Gap Analysis Program (GAP) | Land Cover Data Portal. [Online] 2001. [Cited: August 20, 2014.] <http://gapanalysis.usgs.gov/gaplandcover/data/download/>
152. Minnesota Department of Natural Resources. State Administered Lands. [Online] 2014. ftp://ftp.dnr.state.mn.us/pub/gisftp/shwatson/state_lands/
153. Itasca County, MN. County/Local Parks. Itasca County - Departments - Park System - Itasca County Land Department Park System. [Online] 2014. [Cited: August 20, 2014.] <http://www.co.itasca.mn.us/home/departments/park%20system/pages/county-parks.aspx>
154. U.S. Department of Agriculture. Farmland. U.S. Department of Agriculture - Natural Resources Conservation Service - Web Soil Survey. [Online] 2014. [Cited: August 20, 2014.] <http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

155. State Historic Preservation Society - Minnesota Historical Society. Archaeological Sites. SHPO - Survey and Inventory - Statewide Inventories. [Online] <http://www.mnhs.org/shpo/survey/inventories.php>
156. Minnesota State Historic Preservation Office. SHPO Manual for Archaeological Projects in Minnesota. Survey and Inventory. [Online] July 2005. <http://www.mnhs.org/shpo/survey/archsurvey.pdf>
157. U.S. Fish and Wildlife Service. Statewide National Wetland Inventory. National Wetlands Inventory. [Online] 1997. <http://www.fws.gov/wetlands/Data/State-Downloads.html>
158. U.S. Geological Survey. NHD Waterbodies. <http://nhd.usgs.gov/data.html>. [Online] 2014. <http://nhd.usgs.gov/data.html>
159. —. NHD Flowlines. Hydrography. [Online] 2014. <http://nhd.usgs.gov/data.html>
160. Minnesota Department of Natural Resources. Public Water Inventory Streams. [Online] 2008. <http://deli.dnr.state.mn.us>
161. —. Public Waters Inventory – Basin Delineations. GIS shapefile. The DNR Data Deli. [Online] July 31, 2008. <http://deli.dnr.state.mn.us/metadata.html?id=L390006600201>
162. —. Public Water Inventory Wetlands. The DNR Data Deli. [Online] 2008. <http://deli.dnr.state.mn.us>
163. Minnesota Power. FEMA Floodplain / Flood Hazard Areas. Minnesota Power as published by FEMA on <https://msc.fema.gov/portal>. 2014.
164. U.S. Fish and Wildlife Service/Partner's in Flight. Grassland Bird Conservation Areas. Shapefile from Dan Hertel, U.S. Fish and Wildlife Service to Barr Engineering Co. October 14, 2014.
165. Minnesota Department of Natural Resources. Wildlife Management Areas. The DNR Data Deli. [Online] 2006. <http://deli.dnr.state.mn.us>
166. —. Gray Owl Management Area. Email from Jamie Shrenzel, Minnesota Department of Natural Resources to Barr Engineering Co. November 4, 2014.
167. —. Preliminary MBS Sites of Biodiversity Significance. Shapefiles from Lisa Joyal, Minnesota Department of Natural Resources to Barr Engineering Co. 2014-2015.
168. —. High conservation value forests (HCVF). Forestry - Certification. [Online] 2014. [Cited: December 18, 2014.] <http://www.dnr.state.mn.us/forestry/certification/hcvf.html>
169. —. Preliminary MBS Native Plant Communities. Email from Lisa Joyal, Minnesota Department of Natural Resources to Barr Engineering Co. December 17 2014.
170. U.S. Department of Agriculture. FSA Aerial Imagery. U.S. Department of Agriculture - Natural Resources Conservation Service - Geospatial Data Gateway. [Online] 2013. [Cited: August 20, 2014.] <http://datagateway.nrcs.usda.gov>
171. Minnesota Department of Transportation. Streets and Highways. Geographic Data, Mapping & Analysis - GIS Data Products. [Online] October 1, 2010. <http://www.dot.state.mn.us/maps/gdma/gis-data.html>
172. Minnesota Department of Natural Resources. Trails. The DNR Data Deli. [Online] 2010. <http://deli.dnr.state.mn.us>
173. —. PLSS Line. The DNR Data Deli. [Online] 2009. <http://deli.dnr.state.mn.us>
174. —. NW 50cm Aerial Imagery - Minnesota Geospatial Image Service: Data Layers. Minnesota Geospatial Information Office. [Online] 2014. [Cited: August 20, 2014.] http://www.mngeo.state.mn.us/chouse/wms/wms_image_server_layers.html
175. —. NW 50cm Aerial Imagery - Minnesota Geospatial Image Service: Data Layers. Minnesota Geospatial Information Office. [Online] 2013. [Cited: August 20, 2014.] http://www.mngeo.state.mn.us/chouse/wms/wms_image_server_layers.html
176. —. North 1ft Aerial Imagery - Minnesota Geospatial Image Service: Data Layers. Minnesota Geospatial Information Office. [Online] 2013. [Cited: August 20, 2014.] http://www.mngeo.state.mn.us/chouse/wms/wms_image_server_layers.html
177. —. Ncentral border Aerial Imagery - Minnesota Geospatial Image Service: Data Layers. Minnesota Geospatial Information Office. [Online] 2009. [Cited: August 20, 2014.] http://www.mngeo.state.mn.us/chouse/wms/wms_image_server_layers.html

178. U.S. Fish and Wildlife Service. USFWS Interests. U.S. Fish and Wildlife Service Geospatial Services. [Online] 2014. [Cited: October 10, 2014.] <http://www.fws.gov/gis/index.htm>
179. Minnesota Department of Natural Resources. State Mineral Leases. [Online] 2014. http://files.dnr.state.mn.us/lands_minerals/min_data/mn_state_minerals_leases_all_oct01_2014.zip
180. —. Shallow Lakes. The DNR Data Deli. [Online] 2010. <http://deli.dnr.state.mn.us>
181. National Audubon Society. Important Bird Areas. Audubon. [Online] 2014. [Cited: December 5, 2014.] <http://web4.audubon.org/bird/iba/IBADataRequest.html>.
182. Minnesota Department of Natural Resources. Trails. The DNR Data Deli. [Online] 2003. <http://deli.dnr.state.mn.us>
183. —. Water Trails. The DNR Data Deli. [Online] 2010. <http://deli.dnr.state.mn.us>.
184. —. State Conservation Easements. The DNR Data Deli. [Online] 2010. <http://deli.dnr.state.mn.us>
185. —. Ecologically Important Lowland Conifers. Shapefiles from Jamie Shrenzel, Minnesota Department of Natural Resources to Barr Engineering Co. November 4, 2014.
186. Minnesota Power. cost comparison - Effie and Pine Island - Minnesota Power Response to Request for Information from DOE. April 7, 2015.
187. Minnesota Department of Natural Resources. Scientific and Natural Areas. The DNR Data Deli. [Online] 2003. <http://deli.dnr.state.mn.us>
188. Minnesota Department of Transportation. Aggregate Sources - Gravel Pit and Rock Quarry Aggregate Source Information. [Online] 2015.
189. Minnesota Department of Natural Resources. National Forest. The DNR Data Deli. [Online] 2008. <http://deli.dnr.state.mn.us>
190. —. Water Access Points. The DNR Data Deli. [Online] 2003. <http://deli.dnr.state.mn.us>
191. Minnesota Department of Transportation. 2015-2018 State Transportation Improvement Program (STIP). Planning & Programming. [Online] 2014. <http://www.dot.state.mn.us/planning/program/pdf/stip/2015-2018%20STIP%20FINAL.pdf>
192. Excelsior Energy. Letter to Minnesota Public Utilities Commission In the Matter of a Joint LEPPG Site Permit, HVTL Route Permit and Pipeline (Partial Exemption) Route Permit Application for the Mesaba Energy Project. Minnesota Department of Commerce.energy - Topics - Energy Projects & Rates - Energy Facility Permitting. [Online] June 26, 2012. [http://mn.gov/commerce/energyfacilities/documents/16573/Excelsior%20Reply%20Comments%20NG%20Conversion%20\(6-26-12\).pdf](http://mn.gov/commerce/energyfacilities/documents/16573/Excelsior%20Reply%20Comments%20NG%20Conversion%20(6-26-12).pdf)
193. Minnesota Public Utilities Commission. In the Mailer of the Application for a HVTL Route Permit for the Essar Steel Transmission Project. Minnesota Department of Commerce.energy - Topics - Energy Projects & Rates - Energy Facility Permitting. [Online] August 2, 2010. <http://mn.gov/commerce/energyfacilities/documents/24526/Order%20-%20Final%20Decision.pdf>
194. Minnesota Department of Commerce. Comments and Recommendations DOC EERA Comments and Recommendations on proposed system and route alternatives for the Sandpiper Pipeline Project in Minnesota. Minnesota Department of commerce.energy - Topics - Energy Projects & Rates - Energy Facility Permitting. [Online] 2012. <http://mn.gov/commerce/energyfacilities//resource.html?Id=33938>
195. Council on Environmental Quality - Executive Office of the President. Considering Cumulative Effects under the National Environmental Policy Act. January 1997.
196. Minnesota Department of Transportation. Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD). Minnesota Department of Transportation. [Online] 2014. <http://www.dot.state.mn.us/trafficeng/publ/mutcd/>

197. Bakke, Jordan, Zhou, Zheng and Mudgal, Sumeet. Manitoba Hydro Wind Synergy Study - Final Report. [Online] <https://www.misoenergy.org/Library/Repository/Meeting%20Material/Stakeholder/Planning%20Materials/Manitoba%20Hydro%20Wind%20Synergy%20TRG/Manitoba%20Hydro%20Wind%20Synergy%20Study%20Final%20Report.pdf>
198. Minnesota Power. Memorandum. Response to Request for Information (RFI) - Substation Noise. April 6, 2015.
199. Environmental Protection Agency 2015. Motor Vehicle Emission Simulator (MOVES) [Online] <http://www3.epa.gov/otaq/models/moves/>
200. Greenberg, B. V.P. Bindokas, and J.R. Gauger. 1981. Biological effects of a 765-kV transmission line: exposures and thresholds in honeybee colonies. *Bioelectromagnetics*. 2,315-328.
201. Bindokas, V.P., J.R. Gauger, and B. Greenberg. 1988. Mechanism of effects observed in honey bees (*Apis mellifera*, L.) hived under extra-high-voltage transmission lines: Implications derived from bee exposure to simulated intense electric fields and shocks. *Bioelectromagnetics*. 9, 285-301.
202. Latady, William R. and Marybelle Isham, 2013. Identification of Historic Properties of Traditional Religious and Cultural Significance to the Bois Forte Band in the Minntac Progression Project Area of Potential Effect. Prepared for United States Steel Corporation, Minnesota Ore Operations, Mt. Iron and Hoyt Lakes, Minnesota. September 2013.
203. Latady, William R. and Marybelle Isham, 2014. Identification of Historic Properties of Traditional Religious and Cultural Significance to the Bois Forte Band in the Minntac Extension Project Area of Potential Effect. Prepared for United States Steel Corporation, Minnesota Ore Operations, Mt. Iron, Minnesota. August 2014.
204. Latady, William R. and Marybelle Isham, 2015. Identification of Historic Properties of Traditional Religious and Cultural Significance to the Bois Forte Band in the UTAC Tailings Basin 3 Project Area of Potential Effect. Prepared for Cliff Natural Resources, United Taconite, LLC, Eveleth, Minnesota. January 2015.
205. Bartzke, Gundula S. 2014. Effects of power lines on moose (*Alces alces*) habitat selection, movement, and feeding activities. Norwegian University of Science and Technology, Department of Biology, Trondheim.
206. Bartzke, Gundula S. 2014. The effects of power lines on ungulates and implications for power line routing and rights-of-way management. Norwegian University of Science and Technology, Department of Biology, Trondheim.
207. Bevanger, K., et.al. 2010. Optimal design and routing of powerlines; ecological, technical and economic perspectives. Norwegian Institute for Nature Research, Trondheim.

AC	alternating current	FHWA	Federal Highway Administration
ACHP	Advisory Council on Historic Preservation	FPPA	Farmland Protection Policy Act
ACSR	aluminum conductor steel reinforced	F	fahrenheit
AIMP	Agriculture Impact Mitigation Plan	FR	Federal Register
ALJ	administrative law judge	G	gauss
APE	area of potential effect	GAP	gap analysis program
APLIC	Avian Powerline Interaction Committee	GHGs	greenhouse gases
AQI	air quality index	GNTL	Great Northern Transmission Line
ASCE	American Society of Civil Engineers	GPS	global positioning system
BMP	best management practice	HASP	Health and Safety Plan
BWSR	Minnesota Board of Water and Soil Resources	Hz	hertz kV
CAA	Clean Air Act	ICDs	implantable cardioverter defibrillators
CEQ	Council on Environmental Quality	Kcmil	thousand circular mil
CFR	Code of Federal Regulations	kV	kilovolt
CH ₄	methane	kV/m	kilovolts per meter
CO	carbon monoxide	Leq	equivalent continuous noise level
CO ₂	carbon dioxide	LGUs	local units of government
CWA	Clean Water Act	MBS	Minnesota Biological Survey
dB	decibel	MBTA	Migratory Bird Treaty Act
dBA	A-weighted decibel	MCWS	Manitoba Conservation and Water Stewardship
DOC-EERA	Department of Commerce – Energy Environmental Review and Analysis	MDA	Minnesota Department of Agriculture
DOE	Department of Energy	MDH	Minnesota Department of Health
ECS	ecological classification system	mG	milliGauss
EIS	environmental impact statement	MHz	megahertz
EMF	electric and magnetic fields	MISO	Midcontinent Independent System Operator
EPA	United States Environmental Protection Agency	MnDNR	Minnesota Department of Natural Resources
ESA	Endangered Species Act	MnDOT	Minnesota Department of Transportation
EQB	Environmental Quarterly Bulletin	MN PUC	Minnesota Public Utilities Commission
FAA	Federal Aviation Administration	MPH	miles per hour
FEMA	Federal Emergency Management Agency	MPCA	Minnesota Pollution Control Agency

MW	megawatt	PFO	palustrine forested wetland
NAAQS	National Ambient Air Quality Standards	PLSS	public land survey sections
NEB	National Energy Board	PM	particulate matter
NEMA	National Electrical Manufacturers Association	PPA	power purchase agreement
NEPA	National Environmental Policy Act	PPSA	Power Plant Siting Act
NERC	North American Electrical Reliability Corporation	PSS	palustrine shrub wetland
NESC	National Electric Safety Code	PUB	palustrine unconsolidated bottom pond
NHIS	Natural Heritage Information System	PWI	Public Water Inventory
NHPA	National Historic Preservation Act	ROC	region of comparison
NIEHS	National Institute of Environmental Health Sciences	ROD	Record of Decision
NLCS	National Landscape Conservation System	ROI	region of influence
NO2	nitrogen dioxide	ROW	right of way
NOX	nitrous oxide	RPS	Renewable Portfolio Standard
NOA	Notice of Availability	RTK	real-time kinematic
NPDES	National Pollutant Discharge Elimination System	SA	state assessment
NRCS	Natural Resources Conservation Service	SF6	sulfur hexafluoride
NRHP	National Register of Historic Places	SGCN	species of greatest conservation need
NOA	Notice of Availability	SHPO	State Historic Preservation Office
NOI	Notice of Intent	SIP	State Implementation Plan
NWI	National Wetland Inventory	SO2	sulfur dioxide
O3	ozone	SNA	scientific and natural area
OA	Office of Administrative Hearings	SPCC	spill prevention, control, and countermeasures
OE	Office of Electricity Delivery and Energy Reliability	SSPP	Strategic Sustainability Performance Plan
OSHA	Occupational Safety and Health Administration	SSURGO	Soil Survey Geographic Database
PA	programmatic agreement	STIP	Statewide Transportation Improvement Program
Pb	lead	SWPPP	Stormwater Pollution Prevention Plan
PCBs	polychlorinated biphenyl	TCL	traditional cultural landscape
PEM	palustrine emergent wetland	TCP	traditional cultural property
		TMDL	total maximum daily loads
		U.S.	United States

USACE	U.S. Army Corps of Engineers
U.S.C.	U.S. Code
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WCA	Wetland Conservation Act
WMA	wildlife management area
WPA	watershed protection area

This page left blank intentionally

A

Advisory Council on Historic Preservation (ACHP)
S25, 5-6, 156-158, 677, 693, 699

aerial spraying
S9, S24, S26, S28, 18, 98, 152-154, 191-193, 211-213

aesthetics
S6, S9, S28-29, S36, S38, S41, S46-48, S53, S55-56, S59, 7, 17, 49-50, 85, 97-99, 143-144, 149, 151, 184-186, 188, 207-208, 210, 251, 254, 269, 271, 282-283, 295, 297, 309, 311, 325, 327, 342-343, 353, 366-367, 369, 403-404, 407, 432, 434, 451, 453, 469, 471, 488-489, 506-507, 509-510, 512-513, 543, 545, 563-564, 577, 579, 594, 605-606, 620-621, 624, 671-673, 685, 692

aggregate source
S24, 155-156, 258, 333, 358, 697

agriculture
S24, S26-28, S36, S38-39, S43, S53-54, S58-59, 5, 7, 27, 42, 85, 97-98, 133, 146, 148, 151-154, 160, 162, 164, 167, 185-186, 191-192, 208-209, 211-213, 255, 273, 285, 299, 313, 329-330, 345, 347, 354-355, 369, 409, 411-413, 437, 455, 457, 473-474, 492, 506-509, 512-513, 547, 566, 581-582, 596, 598, 608, 624, 673, 676, 688, 692-696, 699, 701

airport
104-105, 688

air quality
S6, S8, S19-20, S59-60, 2-3, 7, 17, 50, 85-86, 91, 93-97, 114, 673-674, 680, 685, 687-688, 699-700

airstrip
S9, S17-18, S20, S27, S56, 18, 49, 57, 61, 63, 104-106, 643

analysis
S3, S7-10, S16-21, S36-38, S47, S58, 1-3, 7, 12, 16-17, 25-26, 28, 30-31, 40, 42, 53, 55-57, 60, 85-87, 89-90, 93, 95, 98-99, 101, 104, 106-109, 115, 120-121, 124, 128, 130, 132, 134-136, 138, 143, 146, 148, 150-152, 154-155, 157, 162, 167, 169, 173, 179, 181, 184-185, 187, 200, 206, 213, 221, 226, 251, 255-256, 267-268, 272-273, 280-281, 284, 292, 294, 297-298, 307-308, 312, 324, 329-330, 340-341, 344-345, 352, 364-365, 403, 410, 415, 427, 429, 436, 447, 449, 455, 467-468, 485-486, 503-504, 506-509, 543, 547, 560-561, 565, 574-575, 580-581, 591-592, 597, 603, 609, 617-618, 620, 667, 671, 673-675, 678, 683, 687-688, 691, 693, 695-696, 699

Anishinabe
149-150, 188

area of potential effect (APE)
S24, S30-31, S33-35, S44, S49, 156-158, 195, 216, 259-260, 274-275, 287, 301-302, 316-317, 334-335, 347-348, 359-360, 415-417, 439-440, 459-460, 476, 478, 495-496, 551-552, 569, 584-585, 599-600, 611-612, 677, 698-699

APLIC
S10, 18, 42, 47, 49, 699

Applicant proposed measure
50

archaeology
S9, S24, S27-31, S33-35, S39-46, S49, S51-54, S60, 18, 85, 156, 195, 216, 259, 274, 287, 301, 316, 334, 347, 359, 415, 439, 459, 476, 495, 551, 569, 584, 599, 611, 676, 695

avian collision
S25

Avian Powerline Interaction Committee
S10, 18, 47, 699

B

Bald and Golden Eagle Protection Act
4-5, 14, 169

bee(s)
152, 167, 191, 211, 217, 698

best management practices (BMPs)
S5, 11, 36, 43, 45-46, 50, 94, 96, 141-142, 162, 166, 167, 169, 507, 675-676

Blue Route
S4, S11, S16-17, S38-44, S47-57, S60, 29-30, 36, 40, 60-66, 86, 94-96, 100, 102, 139-140, 143, 181, 184, 205-206, 214, 224-225, 251-269, 271, 295-318, 320-325, 332, 365-367, 369, 438, 459, 473, 543-547, 549, 551-562, 577-582, 584-594, 596-603, 605-606, 608-613, 615-621, 624, 643-645, 661-662, 668, 671-672, 676-677

Bois Forte Band
13, 150, 159-161, 189-190, 196, 216, 698

Bureau of Land Management
4, 144, 692

C

calcareous fen
42, 50, 165, 177, 203-204, 267-268, 339, 427, 429

Canada lynx
173-174, 199, 201, 220-221, 266, 280, 292, 340, 426, 447, 466, 484, 559, 574, 590, 616, 694

candidate species
6, 174, 512

certificate of need
S3-4, S7, S19, 1, 8-10, 16, 22, 25-26, 40, 48, 53, 56, 180, 215, 694

Chippewa National Forest
193, 198, 200, 214, 219, 343-344, 350-351, 550

Clean Air Act (CAA)
S1, S20, 13, 91, 93, 699

Clean Water Act (CWA)
S1, 4-5, 11, 13, 36, 162, 164, 699

climate Change
S8, S59, 17, 85, 91-97, 189, 673, 687-688

consultation
S1, S6, S9, S25, S34, S60-61, 1-3, 5-6, 10-11, 18, 50, 56, 150, 157-159, 169, 172, 174, 190, 201, 215, 222, 267, 280, 292, 307, 323, 340, 352, 364, 427, 447, 467, 485, 502, 560, 574, 591, 603, 617, 679-680, 693

cooperating agency
S6, 13-14, 159

corridor sharing

S23, S25, S27-28, S31-33, S35-36, S39-42, S44-47, S50-56, 27, 31, 85, 150, 179-181, 190, 204-205, 210, 224, 251, 268-270, 281, 293-294, 308, 324, 341-342, 352, 364-365, 381, 386, 391, 396, 403, 406, 429-431, 449-450, 468-469, 486-487, 504-505, 543, 561-562, 575-576, 592, 603, 605, 618-619, 621, 631, 641, 684

Council on Environmental Quality (CEQ)

S1, S10, 12, 15, 56, 85, 92, 108, 111, 403, 671, 687, 689, 697, 699

D

decibel (dB)

87, 89, 699

designated critical habitat

14, 173-174, 177, 201, 221-222

E

ecological classification system (ECS)

144, 167, 169-170, 198-199, 203, 219-220, 692, 699

Ecologically Important Lowland Conifer(s)

S44, S47, 198, 203, 223, 265, 267, 268, 279, 291, 307, 322, 324, 339, 352, 363, 366, 369, 425, 446, 466, 484, 502, 557, 573, 590, 603, 616, 697

electrical system reliability

S26, S50, S53-54, 36-37, 180-182, 205-206, 224-226, 369, 512-513, 561-562, 575, 577, 592-593, 618, 624, 684

electric field

S21-22, 126, 128, 130-132, 135, 152

electronic interference

S19-20

electric and magnetic field (see also electric and magnetic field (EMF) and magnetic field)

S8, S21, 2, 17, 85, 97, 99, 126-128, 131-132, 135, 667, 675, 687, 691, 699

electronic interference

7, 85-86, 99-101, 104, 673

employment

S8, S59, 17, 115-120, 122-123, 674, 681, 690

endangered species (see also threatened species)

S1, S25, S27-28, 3-4, 6, 11, 14, 85, 169, 172-174, 201, 221-222, 427, 624, 677, 679, 694, 699

Endangered Species Act (ESA)

S1, S60-61, 3-4, 6, 11, 169, 172, 174, 201, 222, 267, 280, 292, 307, 323, 340, 352, 364, 427, 447, 467, 485, 502, 560, 574, 591, 603, 617, 679-680, 699

environmental contamination

S21-23, 85, 126, 137-138, 141, 675-676

Environmental Impact Statement (EIS)

CSA1-2, S1, S3-11, S16-19, S23-25, S27-29, S56, S59, 1-4, 7-8, 12-19, 22, 53, 55-58, 85-86, 88, 91, 94-95, 98-100, 103, 105-107, 113-114, 116, 118, 120, 122, 125, 128, 132, 134-138, 142, 149-156, 159-160, 165-166, 168, 170, 177, 179-180, 182-183, 187-188, 190-194, 204-206, 210-215, 224, 226, 271, 282, 342, 403, 415, 450, 506-507, 550, 577, 667, 671, 674, 679-680, 683-684, 688, 693, 699

environmental justice

S20, 7, 14, 85, 108-111, 113-114, 673, 685, 689

F

farmland

S7, S24, S26, S28-46, S49-54, S59, 16, 21, 28, 32, 97, 151-154, 188, 191-193, 211-213, 255, 257, 273-274, 285, 299-300, 313-314, 330-331, 345-347, 354-355, 369, 411-413, 437-438, 456-457, 473-475, 492, 494, 508, 510, 512-513, 547, 566-567, 581-583, 598-599, 608, 610, 624, 676, 695, 699

Federal Aviation Administration (FAA)

S4, S20, 4-5, 21, 49, 104-105, 146, 688, 699

Federal Emergency Management Agency (FEMA)

S30, 163-164, 166, 197, 217, 418, 696, 699

federal interest land

39

fishing

S21, 43, 112-115, 123-125, 150-151, 160, 164, 169-170, 187, 189-190, 197, 210

floodplain

S1, S25, S30, S32, S35, S43, S47, S52, 12, 147, 163-166, 261, 318, 335-336, 365, 369, 418, 420, 441-443, 460, 462, 498, 512-513, 553, 586, 624, 672, 692, 696

forestry

S24, S26, S28, S44, S48, S51, S59, 7, 49-50, 85, 107, 124-125, 147, 151, 154-155, 180, 190, 193-194, 203, 208, 211, 213-214, 255-256, 273-274, 285-286, 299-300, 313-315, 329-330, 332, 345, 347, 354, 357, 367, 369, 409, 411, 413-414, 437-438, 455, 457-458, 473-474, 476, 492, 494-495, 506, 512-513, 547, 549, 566, 568, 581-582, 596, 598, 608, 624, 676, 684, 688, 692-694, 696

Forestry Timber Sales Program

154, 193, 213

G

Grassland Bird Conservation Area

S32, 170, 306, 424-425, 445-446, 465-466, 512-513

great gray owl

170, 199-200, 220, 694

Greenhouse Gas (GHG)

S8, S59, 17, 85, 91-97, 673, 685, 687

groundwater

S23, S25, S27-28, 43, 45, 126, 137-141, 162, 164, 166, 177, 196, 217, 429, 676, 694

H

hazardous material

107

Hazardous Waste

S23, 137-140

High Conservation Value Forest

S31-33, S35, S38, 168, 172, 176, 203, 223, 265, 279, 291, 307, 322, 339, 352, 363, 425, 427-429, 445, 448, 466-468, 484, 486, 500, 503, 509, 512-513, 557, 573, 590, 603, 616

historic architectural resource

S9, S24, S27-31, S33-35, S39-46, S46, S48-49, S51-55, S60, 18, 43, 156, 158, 160-161, 195-196, 216-217, 251, 263-265, 287-288, 307-308, 324, 343-344, 356-357, 359-363, 391, 399-400, 414-415, 416-417, 427, 441-442, 456, 460, 474, 487-488, 499, 507-516, 543, 551-552, 569, 584-585, 599-600, 611-612, 620, 622-626, 677

honeybee
698

I

impaired water
S30, S39, S54, 261, 317, 419, 461, 478, 613

Important Bird Area
S34, S36, S38-43, S45, S47-48, S50, S52, S55, 170, 220, 264, 278-279, 290, 306, 321, 338, 365-367, 369, 482-483, 500, 509-510, 556-557, 559, 590, 620

induced voltage
S8, S21-22, 17, 85, 114, 126, 135-136, 153, 191, 212, 674-675

invasive species
S5, S10, S25, 18-19, 43, 45, 114-115, 124, 167-168, 678-679

irrigation system
S24, S26, 152-153, 191-192, 212

L

land use compatibility
S8, S29, S37-38, S47-49, 7, 17, 85, 146, 186, 209, 251, 254, 269, 271, 282-283, 295, 297, 309, 311, 325, 327, 342-343, 353-354, 366-369, 403-404, 407, 432, 434, 451, 453, 469, 471, 488, 490, 510, 512-513, 543, 546, 563-564, 577, 579, 594, 605-606, 624, 672

laydown areas
S1, S7, 1, 16, 21-22, 34-35, 40, 46, 87, 125, 141, 144-146, 157, 167, 173, 184, 186, 191, 193, 195-196, 198, 216, 671-672, 674, 676-677, 679

livestock
S22, S24, S26, S28, 39, 127, 133, 152-154, 167, 191, 193, 211-213

local units of government (LGUs)
S6, S10, 12, 18, 699

low-income populations
108, 111, 113-114, 674

M

magnetic field (see also electric and magnetic field (EMF) and electric field)
S8, S21, 2, 17, 126-128, 130-132, 690

Manitoba Conservation and Water Stewardship (MCWS)
13, 699

Manitoba Hydro
S4, S10, S60, 12-13, 22, 25-26, 28, 31, 48, 53, 96, 180, 215, 674, 688, 698

MBS Native Plant Community (MBS)
S30-33, S35-38, S40-42, S44-45, S47-52, S54-55, S57, 168, 172, 174, 176-177, 198, 203, 219, 223, 265, 267-268, 279-281, 291, 293, 307, 322, 324, 339-341, 352, 363-364, 367-368, 425, 427-429, 445-446, 448, 466-468, 484, 486, 500, 502-503, 508-510, 512-513, 557, 560, 573-574, 590-591, 603, 616-617, 620, 624, 644-645, 657, 661-662, 696, 699

microwave communications
101

Midcontinent Independent System Operator (MISO)
S10-11, S59, 3, 22, 25, 53, 180, 674, 699

Migratory Bird Treaty Act (MBTA)
6, 14, 169, 699

mining and mineral resources
S47-49, S55, S60, 85, 155-156, 194-195, 210, 214-215, 256, 258, 274, 286-287, 300-301, 315-316, 332-333, 347, 357-358, 366-369, 415, 439, 458-459, 476, 495, 512-513, 549-550, 568-569, 582, 584, 598, 608, 611, 620, 624, 676

Minnesota Ambient Air Quality Standards (MAAQS)
91

Minnesota Board of Water and Soil Resources (BWSR)
11, 18, 699

Minnesota Chippewa Tribe
13, 112-113, 115, 122, 149, 160, 189, 196, 216

Minnesota Department of Agriculture (MDA)
11, 42, 49-50, 152, 154, 167, 191-192, 211, 213, 693-694, 699

Minnesota Department of Commerce (DOC)
CSA1-2, S3, S5-10, S16, S18-19, S23, 1-3, 7-8, 12, 14-19, 26-27, 55-56, 60, 149, 188, 210, 252, 257, 261, 265, 267, 269-270, 274, 277, 279, 281-282, 285, 289, 291, 293-295, 299, 305-309, 313, 320, 322, 327, 331, 335, 338-339, 341-342, 360, 362, 405, 418, 428, 431-432, 437, 441, 446, 448-451, 456, 460, 464-465, 467, 469, 483, 503, 505, 544, 557-558, 560-563, 567, 570, 573, 578, 582, 589, 591-592, 602, 610, 615-619, 667, 671, 683, 693, 695, 697

Minnesota Department of Natural Resources (MnDNR)
S10, S19, S30-31, S38, S44, S60, 2, 11, 18-19, 35, 41-42, 45, 47, 49-50, 55, 66, 107, 113, 124-125, 144, 146-147, 154-156, 163, 165-170, 172, 174-178, 184, 188, 193-194, 196-199, 201, 203-204, 207, 213-215, 217, 219-220, 222-223, 252, 255-259, 261-263, 265-270, 272-275, 277, 279-282, 284-287, 289, 291-292, 294-295, 297-299, 301-302, 304-305, 307-309, 312-313, 315-316, 318, 320, 322, 324, 327, 329-331, 335-336, 338-340, 342, 344-345, 352, 358-360, 362-363, 405, 410, 418, 424-429, 431-432, 436-437, 439, 441-442, 445-451, 455-457, 460-462, 464-467, 469, 480, 483-484, 495, 500, 502-503, 505, 544, 547, 550-551, 554-555, 557, 559, 561-563, 565, 567-570, 573-574, 578, 580-583, 590, 592, 597, 603, 609-611, 614-616, 618-619, 644-645, 671, 679, 688-690, 692-697, 699

Minnesota Department of Transportation (MnDOT)
S20, 5, 11, 35, 41, 47, 49, 101-105, 139-140, 155, 180, 205, 224, 258, 269-270, 281, 294, 308, 327, 333, 342, 358, 405, 431-432, 449-451, 469, 505, 561-562, 592, 618-619, 667, 673, 688, 693, 695-697, 699

Minnesota Peatland Protection Act
165

Minnesota Pollution Control Agency (MPCA)
S54, 2, 4-5, 11, 36, 87, 89, 91, 138-140, 162, 197, 217, 261, 418-419, 441, 460, 643, 687-688, 691, 694, 699

Minnesota Public Utilities Commission (MN PUC)
CSA1, S1, S3-7, S9-10, S19, S22-23, S58, 1-2, 4, 6-10, 12, 14, 16, 18-19, 21-22, 25-26, 31, 34-35, 40, 48, 50, 53, 55-56, 88, 91, 94, 96-97, 100-101, 103-107, 114, 116, 119, 128, 130-131, 133-138, 141, 146-148, 152-155, 161, 166, 168, 171, 179-180, 182-183, 186-187, 192, 194, 196, 199-200, 204-206, 208-209, 212-216, 219, 221, 223-224, 226, 267-268, 280, 292-293, 307, 322-324, 339, 341, 352, 364-365, 403, 410, 425, 427, 429, 447-448, 467-468, 485-486, 502-503, 506-507, 559-560, 574-575, 591-592, 603, 617, 619-620, 643, 668, 671, 673, 697, 699

minor alteration
9

minority population
109-110

mitigation
S3, S6, S9-10, S20, S60-61, 2-3, 5, 8, 11, 17-18, 35-37, 41-43, 45-46, 50, 95, 98-100, 102-103, 105-106, 114, 125, 128, 133-134, 142, 153-154, 164, 166, 191-192, 205, 211-212, 225, 425, 506-507, 679-680, 699

N

National Ambient Air Quality Standards (NAAQS)
S20, S22, S59, 91, 93, 673, 687, 700

National Electricity Safety Code (NESC)
9, 33, 35, 40, 45-46, 49-50, 133, 135-136, 141, 700

National Energy Board (NEB)
12-13, 700

National Environmental Policy Act (NEPA)
CSA1, S1, S3, S5, S10, S19, 1-4, 12, 14-15, 53, 56, 85, 92, 108, 156-159, 403, 683-684, 687, 689, 697, 700

National Historic Preservation Act (NHPA)
S1, S9, S24, 2, 5-6, 13-14, 18, 43, 150, 156-159, 260, 334, 416-417, 440, 460, 478, 496, 552, 585, 600, 612, 700

National Pollutant Discharge Elimination System (NPDES)
4, 11, 50, 162, 507, 700

National Register of Historic Places (NRHP)
S24, 50, 156, 158, 252-254, 263-265, 288, 307-308, 324, 326, 344, 399-400, 404, 415, 428, 442, 457, 474-475, 488, 500, 551-552, 569, 584-585, 599-600, 612, 677, 693, 700

No Action alternative
S6-7, S10, 1, 16, 53, 215

noise

S1, S19-20, S60, 2, 7, 16-17, 40, 85-91, 97-99, 101, 125, 153, 171, 178, 191, 212, 409, 415, 506, 662, 672, 678, 680, 685, 687, 698-699

North American Electric Reliability Corporation (NERC)
9, 38, 136, 181, 205, 225, 691, 700

northern long-eared bat
S60, 173-174, 200-201, 221-222, 679, 694

Notice of Availability (NOA)
CSA1, S3, S6, 2, 15, 19, 700

Notice of Intent (NOI)
S1, S6, 14, 55, 700

noxious weed
11, 42, 45, 50, 167

Noxious Weed Management Plan
11

O

Occupational Safety and Health Administration (OSHA)
S23, 45-46, 141-142, 676, 700

Office of Electricity Delivery and Energy Reliability (OE)
S1, S3, 1, 3-4, 15, 683, 693, 700

Orange Route
S4, S17-18, S26, S29-41, S44-59, 13, 29-30, 36, 40, 57-66, 94-96, 100, 102, 104-105, 107, 139-140, 143, 181, 184-185, 194, 205, 208, 210, 224-225, 251-295, 325-342, 353-355, 357-369, 404-408, 410-414, 417-430, 432-438, 440-453, 455-469, 471-474, 476, 478, 480-492, 494, 496, 498-500, 502-504, 508-510, 512-513, 543-547, 549, 551-571, 573-575, 577-582, 584-593, 605-606, 608-613, 615-621, 624, 643-644, 657, 661-662, 668, 671-672, 677

organic farm
152

P

peatland
S23, S36, S55, 55, 57, 61, 63, 65, 163, 165, 176-177, 187-189, 197, 203-204, 223, 268, 324, 341, 429, 508, 620, 695

photosimulation
252, 433, 578

piping plover
173-174, 201, 694

power purchase agreement (PPA)
S4, 26, 53, 96, 700

poweshiek skipperling
173

Power Plant Siting Act (PPSA)
CSA1, S1, S3, S5, 1, 6, 8, 12, 39, 403, 700

Presidential permit
CSA1-2, S1, S3, S7, S10-11, S19, S23, 1-6, 12, 16, 21, 27-28, 30-31, 36, 44, 48, 53, 55-57, 93, 114, 157, 506, 687

Programmatic Agreement (PA)
CSA2, S24-25, S27-28, S30-31, S33-35, S39-46, S49, S51-54, 3, 5-6, 43, 49-50, 157-159, 161, 260, 275, 288, 302, 317, 335, 348, 360, 416-417, 440, 460, 478, 496, 552, 569, 585, 600, 612, 676-677, 691, 700

property tax
120, 690

property values
S6, S8, S20, 2, 7, 17, 85-86, 97-99, 154, 193, 213, 673, 687

public utilities
S1, S3, 1, 3, 6, 9, 21, 35, 88, 101, 106, 403, 668, 693, 697, 699

Public Waters Inventory (PWI)
S30, S32-35, S39, S43-44, S50-54, S57, 11, 50, 66, 163, 165-166, 196, 217, 261-262, 317-318, 335, 349, 418-419, 441, 460-461, 478-480, 496, 498, 553-554, 570, 586, 613-614, 644-645, 696, 700

Public Waters Work Permit
11, 165

R

railways
35, 50, 101-103

reasonably foreseeable future project
S60, 678-679

recreation
S8, S21, S47, 7, 10, 17, 49-50, 85, 97, 107, 113, 117, 124-125, 145, 147, 164, 170, 185, 208, 251-252, 366, 369, 506, 577, 674-675, 695

Red Lake Band of Chippewa Indians
S6, S25, 1, 13-14, 113, 115, 123, 157, 159, 683, 690

Red Lake Indian Reservation
112-113, 122

regeneration station
CSA1, 40, 661-662

relative merits
S36, S47, S55-56, 3, 251, 354-363, 365-376, 403, 505-516, 619-626, 684

Resource Conservation and Recovery Act
13, 137

restoration
9, 44-45, 50, 88, 190, 506-507

re-vegetation
44-45, 167

roadways
S20, 22, 34-35, 101-104, 107, 145, 166, 179-180, 430, 667

Region of Influence (ROI)
S9, 1-2, 17, 85-89, 91, 93-95, 98-102, 104-122, 124-126, 128, 132, 134-136, 138, 141-144, 146, 148, 152, 154-155, 157, 162, 167, 169, 173, 179, 181, 184, 186-187, 191, 193-196, 198-200, 204-205, 207, 209-211, 213-214, 216-217, 219-221, 224-225, 251-256, 258, 260, 262-263, 265, 267-269, 271-274, 276, 278-286, 288, 290-292, 294-301, 303-304, 306-315, 317, 320-322, 324-325, 327-330, 332-333, 335, 337-345, 347-350, 352-355, 357-358, 360, 362-364, 404-405, 407, 411, 413, 415, 418, 421-422, 424-425, 427, 429, 432-439, 441, 443-444, 446-447, 449, 451-455, 457-458, 461, 463-464, 466-469, 471, 473-474, 476, 478, 481-482, 484-486, 488, 490-492, 494-496, 499-500, 502-504, 543-547, 549-550, 552-555, 557, 560-561, 563-566, 568, 570-571, 573-575, 577-582, 585, 587-588, 590-592, 594, 596-598, 600, 602-603, 605-609, 613, 615-618, 667, 671-677, 679, 700

Route Permit
CSA1-2, S1, S3, S5, S10, S19, S23, S58, 1-4, 6-10, 12, 18-19, 21, 27-28, 30-31, 34-35, 40-41, 44, 48, 50, 55-56, 94, 96-97, 100-101, 103-105, 107, 114, 137-138, 141-142, 146-148, 152-155, 161, 168, 171, 179, 186-187, 192, 194, 196, 199-200, 204, 208-209, 212-214, 216, 219, 221, 223, 267-268, 280, 292-293, 307, 322-324, 339, 341, 352, 364-365, 410, 425, 427, 429, 447-448, 467-468, 485-486, 502-503, 506-507, 559-560, 574-575, 591-592, 603, 617, 620, 643, 668, 671, 673, 687, 693, 697

S

Scenic Byway
S9, S32, 17, 125, 145, 185, 326, 406, 432-434, 451

Scientific and Natural Area (SNA)
S19, S36, S48, 27, 55-57, 61, 124, 165-166, 172, 174-178, 197-198, 203-204, 223, 268, 273, 275-277, 293, 314, 324, 341-342, 348, 356, 359-363, 367, 369, 405, 408, 431, 425, 428-429, 447, 462, 464, 479, 481, 492, 503, 507-509, 512-513, 557, 573, 577, 590, 603, 616, 674, 700

Scoping Meeting
S6, 14

Section 7
3-6, 172, 174, 201, 222, 251, 275, 295, 315, 333, 350, 407, 420, 447, 463, 480, 492, 504, 560, 574, 591, 603, 617

Section 10 Permit
4

Section 106
S9, S24, S30-31, S33-35, S39-46, S49, S51-54, 2, 3, 4-6, 10, 13-14, 18, 43, 150, 156-159, 260, 334, 415-417, 440, 460, 478, 496, 552, 585, 600, 612

Section 401 water quality certification
11, 162

Section 404 permit
4, 13, 36

Series Compensation Station
CSA1, S1, S4, S7-8, S19, S58, 1, 16, 21, 34, 40, 46-47, 87-91, 98, 124, 126, 128, 132, 134-138, 141, 144, 146, 152, 154-155, 157, 162, 167, 169, 173, 184, 186, 191, 193-196, 198-200, 207, 209, 211, 213-214, 216-217, 219-221, 661, 671-677, 679

Service
S6, S19-20, S58, S60, 1, 4, 14, 26-28, 31, 36-37, 41, 50, 59-60, 86, 98, 101-102, 106-107, 114, 118, 121-123, 130, 132-134, 143, 152, 157, 179, 210, 215, 408, 411, 413, 661, 674, 679, 683, 687-688, 691-697, 700-701

Shallow Lakes Program
169-170

socioeconomics
S8, S20, S59, 7, 17, 85, 114-115, 674, 685

Special Use Permit
4-5, 14

Species of special concern
172

Spill Prevention Control and Countermeasure (SPCC)
S5, S22, 43, 50, 137-138, 141, 700

Sprague's pipit
173-175, 274-275, 294-295, 359-360, 427, 446, 512

staging area
22, 34

state fee land
S26, S43-45, S49-50, S53-54, 66, 146-147, 186, 209, 271, 283, 298, 311, 328, 344, 408, 453, 471, 491, 546, 564, 580, 596, 608

state forest
S23-24, S26-27, S29-37, S39-46, S48-51, S56-57, 62, 64, 66, 123, 144, 146-147, 154, 168, 170, 174, 176, 185-186, 193, 198, 208-209, 213, 219, 223, 254, 256-258, 263, 265, 271-277, 282-283, 285-286, 289-290, 296-301, 304-305, 311, 313-315, 320, 327-329, 331-332, 337-338, 343-345, 347, 350, 354, 357-358, 362, 367, 369, 405-406, 408, 410, 413-414, 422-423, 432, 434-435, 437-439, 443, 446, 452-453, 455-458, 463-464, 469, 471, 473-475, 481, 483, 488, 491, 494-495, 500, 508-509, 512-513, 546, 549, 555, 557, 563-564, 566-568, 571, 580-582, 596, 608, 624, 643-645, 657, 661-662

State Historic Preservation Office (SHPO)
S25, 5-6, 10, 150, 157-159, 252, 260, 327, 405, 432, 440, 451, 477, 544, 552, 578, 600, 677, 694-696, 700

state mineral lease
S34, S39, S41-47, S49, S51-55, 258, 358, 366, 415, 476, 550, 568, 620

Stormwater Pollution Prevention Plan (SWPP)
11, 50, 162, 700

stray voltage
S21-22, 2, 85, 114, 126, 132-134, 153-154, 191, 193, 212-213, 674-675, 691

subsistence
43, 112-115, 122-124, 159, 188, 195, 674

I

threatened species
S28, S48, 11, 172, 174, 201, 221, 367, 447

tourism
S8, S21, S47, 7, 17, 27, 49-50, 85, 121, 124-125, 147-148, 151, 169, 366, 506, 674-675

traditional cultural landscape (TCL)
156, 161, 700

traditional cultural property
156, 161, 700

traffic
S20, S23, S60, 22, 34, 40-41, 46, 88, 94, 102-103, 145, 180, 673, 680, 684, 688, 697

U

U.S. Army Corps of Engineers (USACE)
CSA1, S6, S10, S25, 1, 4-5, 11, 13, 18, 36, 157, 162, 164, 166, 678, 683, 692, 701

U.S. Department of Agriculture (USDA)
S58, 5, 133, 152-153, 191-192, 211-212, 257, 269-270, 274, 281, 285, 294, 299-300, 308, 313-314, 331, 342, 346, 411, 431, 437-438, 449-450, 456, 469, 475, 494, 505, 561-562, 567, 582-583, 592, 599, 610, 618-619, 661, 693, 692-693, 695-696, 701

U.S. Department of Energy (DOE)
S1, S3-11, S16, S18-20, S23-25, 1-6, 10, 12-19, 21, 26, 28, 36-37, 49, 53, 55-57, 90, 93, 108, 130, 149-150, 157-159, 161, 163-164, 169, 172, 188, 196, 210, 216, 259-260, 267, 275, 280, 287-288, 292, 302, 307, 316-317, 323, 334-335, 340, 348, 352, 359-360, 364, 415-417, 427, 440, 447, 459-460, 467, 476, 478, 485, 496, 502, 551-552, 560, 569, 574, 584-585, 591, 599-600, 603, 612, 617, 677, 680, 683, 687, 693-694, 697, 699

U.S. Environmental Protection Agency (EPA)
CSA1, S3, S6, S20, 1-5, 13-15, 19, 91-94, 96-97, 108, 111, 162, 164, 673, 683, 687-689, 694, 698-699

U.S. Federal Highway Administration (FHWA)
4, 144, 687, 699

U.S. Fish and Wildlife Service (USFWS)
CSA1, S6, S9, S24, S26, S32, S34-35, S38-40, S44-45, S47-48, S60-61, 1, 3-6, 13-14, 18, 27, 35-36, 41-42, 47, 49, 59-60, 62-63, 123, 146-147, 154, 164, 167, 169-170, 172-174, 178, 186, 193, 201, 213, 221-222, 254-256, 261, 264, 267, 271-273, 276-277, 280, 289, 292, 298, 307, 311, 319, 323, 328-330, 335, 337, 340, 344-345, 352, 354, 360-361, 364, 366-367, 369, 408, 418, 424-425, 427, 435, 441, 444, 446-447, 453, 455, 460, 463, 465, 467, 472, 481, 485, 491, 502, 510, 513, 546, 556, 560, 564, 570-571, 574, 580, 591, 596, 600-601, 603, 608, 614, 617, 643, 679-680, 683, 692, 694, 696-697, 701

U.S. Forest Service (USFS)
4-5, 143-144, 154, 167, 169, 193, 199, 213, 220, 413, 692, 701

V

vegetation clearing
S10, 19, 41-42, 45, 47, 165-166, 171, 178, 678, 680

W

Water Appropriation
11, 163, 668

waterbody
S32, S47, S57, 66, 260-261, 303, 317, 349, 365, 461, 478, 644-645

watercourse
S30, S34-35, S47, S57, 260, 303, 317, 349, 365, 418-419, 461, 478, 570, 657

watershed protection area (WPA)
S48, 113, 165-166, 177-178, 197, 204, 277, 359-360, 363, 408, 481, 507, 509, 512-513

wetland
S1, S6-7, S9-10, S24-25, S30, S32-34, S36-38, S40-44, S46-48, S50-54, S56, S58, S60-61, 5, 7, 11-12, 16, 18, 27, 36, 43-45, 50, 138, 146, 162, 164-167, 170, 177, 189, 197, 199-200, 203, 217, 221, 223, 260-262, 264, 276-277, 288-289, 303, 305, 317-320, 335-337, 348-349, 360-361, 365-367, 369, 418-421, 441-442, 444, 461-463, 478, 480-481, 496, 498-499, 507-509, 512-513, 553-554, 556, 570-571, 585-587, 601, 613-614, 621, 624, 661-662, 677-678, 680-681, 694, 696, 700-701

Wetland Conservation Act (WCA)

S24, 11, 146, 164-165, 176-177, 701

wildlife

S6, S10, S16, S21-22, S25, S27-30, S32-33, S35,
S37-38, S46-48, S51-56, S60-61,
1, 5, 7, 10-11, 14, 18, 27, 36, 41, 49, 56, 58-59, 85,
113-114, 123, 125, 137, 162-164, 166, 168-171,
177, 188-189, 196, 199-200, 203, 217, 220-221,
260, 263-265, 275, 278-279, 288, 290-291, 303,
306, 317, 321-322, 335, 338-339, 348, 350-351,
360, 362-363, 365-367, 369, 379, 384, 389, 394,
403, 408, 417, 424-425, 441, 444-446, 460, 464-
466, 478, 482-484, 496, 500, 506, 509-510, 512-
513, 552, 555-559, 570, 573, 585, 588-590, 600,
602-603, 612, 615-616, 620-621, 624, 629, 639,
677-681, 683-684, 689, 692, 694, 696-697, 701

Wildlife Management Area (WMA)

S8, S17-18, S24, S26, S29, S31-33, S37, S39, S47,
S56-57, 17, 57-62, 86, 100, 102, 104-105, 128,
139, 143, 146, 156, 165, 167, 170, 174, 176, 186,
200, 264, 365, 369, 403, 424-425, 432-469, 508-
509, 512-513, 575, 643, 647, 657, 701

wild rice

31, 43, 50, 66, 113-115, 123-124, 160, 188-190,
195, 210, 644, 689

worker health and safety

S23, 85, 141-142, 676

This page left blank intentionally